DOCUMENT RESUME

ED 321 739 IR 014 501

AUTHOR	Braden, Roberts A., Ed.; And Others
TITLE	Perceptions of Visual Literacy. Selected Readings from the Annual Conference of the International Visual Literacy Association (21st, Scottsdale, Arizona, October 1989).
INSTITUTION	International Visual Literacy Association, Bloomington, IN.
REPORT NO	ISBN-0-945829-02-9
PUB DATE	90
NOTE	348p.
AVAILABLE FROM	International Visual Literacy Association, Educational Technologies LRC, Virginia Tech, Blacksburg, VA 24061-0232 ($25.00).
PUB TYPE	Collected Works - Conference Proceedings (021) -- Reference Materials - Bibliographies (131) -- Reports - Research/Technical (143)
EDRS PRICE	MF01/PC14 Plus Postage.
DESCRIPTORS	*Aesthetic Education; Creativity; Data Interpretation; *Instructional Design; *Perceptual Development; Semiotics; *Visual Aids; *Visual Literacy; *Visual Perception
IDENTIFIERS	*Media Literacy

ABSTRACT

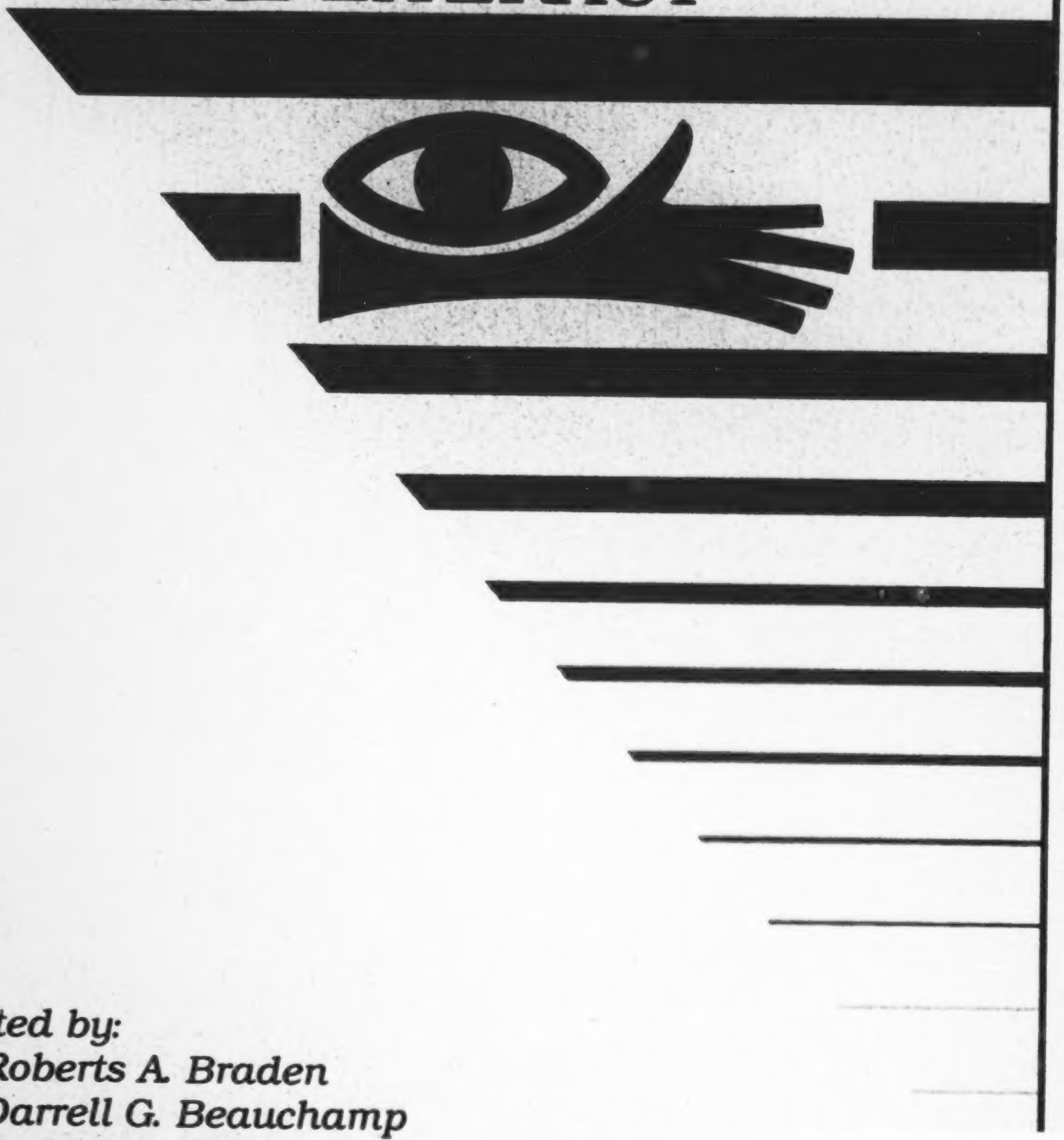
These proceedings contain 37 papers from 51 authors noted for their expertise in the field of visual literacy. The collection is divided into three sections: (1) "Examining Visual Literacy" (including, in addition to a 7-year International Visual Literacy Association bibliography covering the period from 1983-1989, papers on the perception of symbols, the effect of graphic formats on the interpretation of quantitative data, the effect of artistic style on the selection of books by children, media literacy education, the effectiveness of flow diagrams in learning verbal chains, and the development of visual-spatial understanding in fifth grade females); (2) "Extending Visual Literacy" (including papers on teaching visual literacy, visual literacy outreach possibilities, the structured writing technique, implications of creativity research for managers of instructional design, a visual approach to group authorship, and video report cards); and (3) "Experiencing Visual Literacy" (including papers on three dimensional video, advertising and persuasion, use of innovative electronic manipulation in storytelling, and the power of electronic technologies as tools for thinking and learning). Most of the papers contain references. (GL)

****
*   Reproductions supplied by EDRS are the best that can be made   *
*   from the original document.   *
****

ED321739

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

PERCEPTIONS OF VISUAL LITERACY



Edited by:
Roberts A. Braden
Darrell G. Beauchamp
Judy Clark Baca

IR014501

BEST COPY AVAILABLE

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Darrell Beauchamp

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

PERCEPTIONS OF VISUAL LITERACY

Selected Readings from the 21st Annual Conference of the International Visual Literacy Association

Edited by

Roberts A. Braden
Darrell G. Beauchamp
Judy Clark Baca

Published at the University of Central Arkansas
Conway, Arkansas

© THE INTERNATIONAL VISUAL LITERACY ASSOCIATION
1990

ISBN 0-945829-02-9

Acknowledgements

To bring a project of this sort to closure requires the long hours and hard work of a number of persons. Special words of thanks go out to:

The authors of the articles, for their prompt response to suggestions and editing marks;

The organizers of the 21st Annual Conference of the International Visual Literacy Association held in Scottsdale, Arizona;

Joe Hundley and the Center for Academic Excellence at the University of Central Arkansas, for their continued support of projects like these;

The Department of Educational Media and Library Science, The College of Education, and the **University of Central Arkansas**, Conway, Arkansas for their logistical and technical support;

Ann and Bob Cantrell, Cantrell Printing, Conway, Arkansas for their consistency and attention to detail;

and

Beverly Braden for her warmth, love, support, hospitality and warm meals during the arduous days and nights of editing.

TABLE OF CONTENTS

Perceptions of Visual Literacy: A Preface
Darrell Beauchamp.......... *v*

EXAMINING VISUAL LITERACY

Symbols--Studies of Color, Shape and Design
Rune Pettersson.......... 1

Effects of Flow Diagrams and Texts with Instructive Questions on Learning Verbal Chains
Robert C. Branch and David M. Moore.......... *9*

The Effect of Graphic Format on the Immediate and Delayed Interpretation of Quantitative Data (Phase II)
J. Thomas Head and David M. Moore.......... *19*

Interpretation of Quantitative Data: The Effect of Graphic Format, Age, and Gender
Helen B. Miller.......... *27*

Square One Television and Gender
Ann De Vaney and Alejandra Elenes.......... *39*

Researching the Historical Film
James Kenny and Isabel Enriquez Kenny.......... *51*

White Space, Graphics, and Text
Nancy Nelson Knupfer and Marina Stock McIsaac.......... *63*

Development of Visual-Spatial Understanding in Fifth Grade Females
John C. Belland and Sally Trethewey.......... *71*

Children's Responses to Images of the Southwest
John Warren Stewig.......... *77*

Is Artistic Style a Factor in Children's Book Selection? What Children Prefer and Why They Prefer It
Inez L. Ramsey.......... *89*

The Delphi Study: A Proposed Method for Resolving Visual Literacy Uncertainties
Judy Clark Baca and Roberts A. Braden.......... *99*

Media Literacy Education Needs for Elementary Schools: A Survey
Donna Lloyd-Kolkin and Kathleen Tyner.......... *107*

Visualization and Deafness: A Review of Research
Fatemeh Olia.......... *123*

Examining Visual Literacy, 1983-1989: A Seven-Year IVLA Bibliography
Alice D. Walker *131*

EXTENDING VISUAL LITERACY

Teaching Visual Literacy Using a Computer-Based Audiographic Telecommunication System
Landra L. Rezabek *161*

Visual Literacy Outreach Possibilities
Deborah Curtiss *169*

The Structured Writing Technique of Visually Organizing Content: Its Roots and Fruits
J. Alan Whiteside, Mary F. Whiteside and Robert E. Griffin *179*

Implications of Creativity Research for Managers of Instructional Design
Richard Couch and Helen B. Miller *201*

A Visual Approach to Group Authorship
Janet E. Boyle, Merton E. Thompson and R.J. Van Dreser *211*

A Systems Approach to the Production of a Slide Presentation
John P. Vergis *215*

Visual Imaging on the Color Copier / The New Generation
Mary Stieglitz Witte *221*

Video Report Cards: A Visual Communication Method for Summative Evaluation
Don Sneed and K. Tim Wulfemeyer *227*

Critical Thinking-Visual Thinking: Applications for Research and Production
Eleanor P. Gnizak and Rita Girshman *237*

Fun with Pictures, Puns, and American Idioms--or Madison Avenue Helps Teach Visual, Verbal, and Cultural Literacy
LaVerne W. Miller *245*

Visual Literacy and Communications
Patricia Schallert-Lawrie *247*

Teaching Literacy Through Visual Methods: The Syntactic Modeling System
Hyo Yeon and Annegret Reichmann *253*

Strengthening Communication Through the Use of Dramatic Structures
Barbara Roos *255*

Discovering Creativity
Dorothy H. Kennett 261

EXPERIENCING VISUAL LITERACY

Three Dimensional Video: Perceptual and Aesthetic Drawbacks
Nikos Metallinos 265

Use of Innovative Electronic Manipulation in Storytelling: An Example from "Thirtysomething"
Ants. A. Leps 283

Subliminal Seduction or Visual Illiteracy?
Ronald E. Sutton 287

Advertising and Persuasion: From "Logical" Argumentation to Seductive Ambiguity
Denise Kervin 295

The Hollywood Icon of the Cowboy Hero
Joan S. Durden 317

From Cubism to Holography
Hilary McLellan 325

Cinematic Thinking in the Age of Computing
Roger B. Wyatt 335

The Shamanic Journey: Direct Access to the Muse
Thomas R. Lightfoot 339

AUTHOR INDEX

Baca, Judy Clark 99
Beauchamp, Darrell G. v
Belland, John C. 71
Boyle, Janet E. 211
Braden, Roberts A. 99
Branch, Robert C. 9
Couch, Richard 201
Curtiss, Deborah 169
De Vaney, Ann 39
Durden, Joan S. 317
Elenes, Alejandra 39
Girshman, Rita 237
Gnizak, Eleanor P. 237
Griffin, Robert E. 179
Head, J. Thomas 19
Kennett, Dorothy H. 261

Author Index (continued)

Kenny, Isabel E. *51*
Kenny, James *51*
Kervin, Denise *295*
Knupfer, Nancy Nelson *63*
Leps, Ants. A. *283*
Lightfoot, Thomas R. *339*
Lloyd-Kolkin, Donna *107*
McIsaac, Marina Stock *63*
McLellan, Hilary *325*
Metallinos, Nikos *265*
Miller, Helen B. *27, 201*
Miller, LaVerne W. *245*
Moore, David M. *9, 19*
Olia, Fatemeh *123*
Pettersson, Rune *1*
Ramsey, Inez L. *89*
Reichmann, Annegret *253*
Rezabek, Landra L. *161*
Roos, Barbara *255*
Schallert-Lawrie, Patricia *247*
Sneed, Don *227*
Stewig, John Warren *77*
Sutton, Ronald E. *287*
Thompson, Merton E. *211*
Trethewey, Sally *71*
Tyner, Kathleen *107*
Van Dreser, R.J. *211*
Vergis, John P. *215*
Walker, Alice D. *131*
Whiteside, J. Alan *179*
Whiteside, Mary F. *179*
Witte, Mary Stieglitz *221*
Wulfemeyer, K. Tim *227*
Wyatt, Roger B. *335*
Yeon, Hyo *253*

PERCEPTIONS OF VISUAL LITERACY

A PREFACE

Darrell G. Beauchamp

"*Perceptions of Visual Literacy*" is what the editors decided to title this book. It's a broad title that implies an understanding of the field and all it encompasses. The word perception itself indicates, minimally, that we are in the process of "discovery" or, as the dictionary states, that we have an "awareness of... a consciousness" for the field and what is going on in it. This book, hopefully, represents the current thinking in the field and is representative of the works and research being performed by its members. This book, although not a perfect representation of our field, should represent what is being done, and who is doing it.

Putting the book together

Getting to this point has been a long and tiring process, consisting of many long distance phone calls, more than a few over-night "expressed" letters, and a few late nights with lots and lots of work. Getting to this point has required that the editorial team work together and that they be in constant contact with each other, and the authors, as the book progressed.

It all started prior to Scottsdale, Arizona (the site of the 21st Annual Conference of the International Visual Literacy Association) when the call for papers and presentations was sent out. Many proposals were received, and from those, the conference hosts made the selection of what would be presented at the conference. During the conference, the editors gathered papers, made notes to contact those presenters without papers, and began the process of editing.

Following the conference, the editors read, made suggestions, discussed format problems, discussed the overall theme of the book, and generally started the process of putting it all together. When all three editors had made comments, those comments and suggested corrections were sent to the authors. The authors then returned the corrected papers (some more rapidly than others) and the process of lay-up began.

During the lay-up phase, groupings of articles were established, headlines finalized, a table of contents put together, and the cover designed. Then it went to the printer who, because she wanted to get it right, called several times a day. Her attention to detail shows up throughout.

We decided that the papers for the book should be divided into three major sections: Examining Visual Literacy (research etc.), Extending Visual Literacy (application), and Experiencing Visual Literacy (the aesthetics and emotions of the field). The book contains thirty-six papers written by fifty-one authors. Although many of the authors included in this years book have written for previous IVLA books, there are several authors this year whose contribution is a first for IVLA. This kind of participation can only strengthen the field (and thus the organization).

The need for visuals

One of the complaints heard from year to year is that the book is not "visual enough", that it does not accurately represent our "very visual field". We agree. One of the things that we tried to do this year was solicit visuals. Although there are several good visuals in this book, there are several that had to be left out because authors could not get permission from the original copyright owners. We should all keep working to resolve this very important issue.

Our goals

One of the continuing goals of the International Visual Literacy Association is the promotion of Visual Literacy as a field of study. One way in which study in the field can be promoted is through the use of the organizations available literature. This book is only one facet of that promotion. We hope that it adds to the knowledge of the field and that it plays its part in that process of "perception", that continuing process of "discovery."

EXAMINING VISUAL LITERACY

SYMBOLS--STUDIES OF COLOR, SHAPE AND DESIGN

Rune Pettersson

Abstract
524 subjects made a total of 5,511 statements related to the perception of symbols. The results from four different experiments showed that

- there is a considerable difference between the interpretation of symbols by subjects and the intended meanings.
- there is no natural, spontaneous and unambiguous correlation between color and shape.
- there is a large degree of perceptual constancy.

Taking up only a very small amount of space, symbols can convey a message containing a large amount of varying information, equivalent to one or more sentences of text. Image perception is very rapid, virtually "instantaneous". Reading and comprehending the equivalent message in words takes much more time. So symbols permit *rapid reading*. This is important in numerous situations, e.g. in traffic, industry and aviation.

Intended and perceived meaning of symbols

In 1988, a study was conducted under my leadership by CLEA at Stockholm University of the way subjects perceived the meaning of *icons*, i.e. symbols employed in computer programs (N. Scüsseleder and Å. Troedsson). The study comprised empirical experiments with two groups, each comprising 48 subjects. The task of subjects in one group was to supply oral descriptions of 38 icons in commercially available computer programs for the Macintosh computer. Subjects in the other group listened to program manual definitions read aloud to them and were then asked to point to the respective icon. In both instances, the experiments were performed in random sequence. So the statistical material encompassed 3,648 statements.

The results showed *that there was a very considerable difference between the interpretation of icons by subjects and the intended meanings*. Not a single icon was correctly interpreted by all the subjects in either of the two sets of experiments. Only 10.5% (4) of the icons were correctly interpreted by at least 75% of the subjects. Only 23.7% (9) of the icons were interpreted correctly by at least 50% of the subjects. As expected, results were better when the task was to relate icons to their verbal definitions. Here, 47.4% (18) of the icons were correctly interpreted by at least 75% of the subjects. 63.2% (24) were correctly interpreted by at least 50% of the subjects. So the range of *association options was greatly restricted when verbal descriptions were available.*

Color - shape - color

The relationship between color and shape as stimuli has been studied by many researchers. Otto and Askov (1968) found that the importance of these stimuli is related to the respective subject's level of development. For small children (three to six years), color stimuli have greater impact than shape stimuli. However, the reverse is true of older children; i.e., shape becomes more important than color. Modreski and Gross (1971) found that four-year-olds were better at pairing objects by shape than by color. Ward and Naus (1973) studied pre-school children and found that they were also better at identifying objects by their shape than by their color. MacBeth (1974) found that children from three to eight emphatically tended to sort colored paper by shape rather than by color, so shape is often more important to children than color.

According to Keates (1982) the term shape is reserved for the spatial arrangement of geographical features The apparently equivalent term 'form' can only be applied directly to point or line symbols on maps. Form is an element in identification, whereas shape leads to recognition. Johannes Itten (1971) maintained that shapes, like colors, have their own sensual, expressive value. The expressive qualities of shape and form must provide mutual support. All shapes characterized by horizontal and vertical lines belong to the square shape category; i.e., even the cross, rectangle, and similar shapes. The square is equivalent to the color red. The weight and opaqueness of red is related to the static, heavy shape of the square. The triangle's pointed vertices suggest belligerence and aggression. All diagonal shapes in nature, such as the rhombus, parallel trapezoid, zigzag lines, and similar shapes, are counted as triangles. The triangle is the symbol of thought. Its chromatic equivalent is yellow. Shapes circular in nature, such as the ellipse, oval, waves, parabola, and similar shapes, belong to the same category as circles. The chromatic equivalent of the unceasingly restless circle is blue.

In his comprehensive "symbols dictionary", *Symbol Sourcebook*, Dreyfuss (1972) described a large number of meanings for different, basic geometric shapes. These meanings vary considerably from one field to another. As far as the correlation between color and shape is concerned, Dreyfuss pointed out that the following tradition prevails: yellow - triangle, orange - rectangle, red - square, purple - ellipse, blue - circle, green - regular hexagon, brown - rhombus, black parallel trapezoid, white - semicircle, gray - hourglass, silver - bi-concave and gold bi-convex.

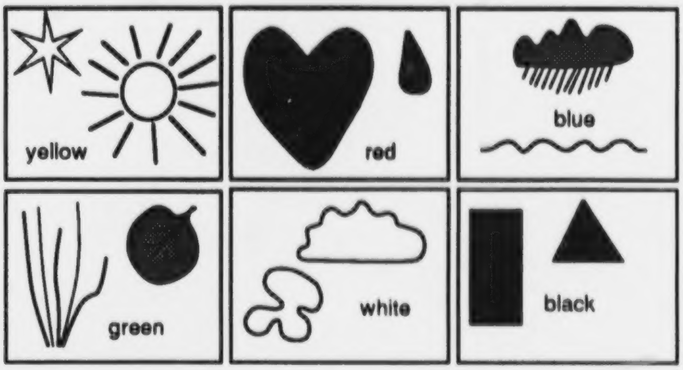
Accordingly, one might well ask if there is any correlation between traditional perceptions and "natural" or spontaneous views of matches between shape and color. In order to shed some light on this matter, we performed two empirical studies, one devoted to the color-shape relationship and the other devoted to the shape-color relationship.

Color-shape

118 upper-level comprehensive school students and 12 adults, i.e. a total of 130 subjects took part in a color-shape experiment. They were given an A4-sized sheet of paper on which the names of six colors, yellow, red, blue, green, white and black, were printed in a random sequence. The subjects were asked to "draw the shape you feel best matches the respective name of a color". They had 15 minutes to complete the assignment. Subjects also supplied information on their age and sex. They produced a total of 780 visual statements on the correlation between color and shape.

The results clearly showed *that there was no natural, spontaneous and unambiguous correlation between color and shape*. The color names used all gave rise to many different geometric shapes. In no instance did an anticipated, traditional shape predominate over other shapes. In three instances, the anticipated shape was not drawn at all. In the other three instances, the anticipated shape was only drawn in 2-3% of the visual statements.

The study disclosed a considerable spread in the way subjects develop associations with different natural phenomena, different objects and different geometric figures. One or more subjects predominated for each color. Subjects related *yellow* primarily to the sun and other heavenly bodies, *red* to love and blood, *blue* to water and clouds, *green* to various kinds of plants and *white* to clouds or snow and even, like *black*, to various geometric figures. Geometric figures delineated by straight lines were more common for white and black than was the case for "soft" figures. Rectangles, squares and triangles were particularly common.



Examples of the most typical figures that the subjects made associations to when they were given a color name as stimulus. (For further details see appendix.)

The study also showed that there is no real difference between boys and girls, as regards associations between color and shape. Intra-group variations were greater than inter-group variations. One interesting finding was that students *perceived shape as a colored area*, only infrequently delineated by a line. Thus, yellow is a yellow area, red a red area, blue a blue area, green a green area and black a black area. White is a white area delineated by a thin line (on white paper). Several students probably did not regard white as a color. Color was divorced from shape for subjects in the adult group. In this group, all colors were delineated by a thin line (pencil, ball point, India ink).

Shape-color

157 upper-level comprehensive school students (not the same as those who participated in the color-shape experiment) were each given an A-4 sized sheet of paper on which six shapes, i.e. a square, star, "jigsaw puzzle piece", circle, triangle and rectangle, were printed. Their task was: "Color the shapes on this page. Select the colors you feel are best suited to the respective shape." They had 15 minutes to complete the assignment. Subjects also supplied information on their age and sex. They produced a total of 942 visual statements on the correlation between shape and color.

The results clearly showed *that there was no natural, spontaneous and unambiguous correlation between shape and color*. We sorted the visual statements on each page into the following color categories: yellow, orange, red, purple, blue, greenish blue, green, yellowish green, brown, black, white, gray and "multiple simultaneous colors". No form had less than 11 of the 13 color categories. The most common colors were as follows:

Triangle: purple (14%), orange, blue and green (each 13%).
Star: yellow (34%), orange (22%), red: (12%);
Square: blue (32%), red (15%) and purple (14%);
Rectangle: green (16%), purple, blue and brown (13%);
Circle: red (22%), purple and blue (both 15%);
"Jigsaw puzzle piece": red (22%), purple (20%) and green (16%).

In total, the most popular colors were blue (16%), red (15%) and purple (14%), followed by green (12%), yellow (11%) and orange (10%). The colors used least were brown (6%), black and greenish blue (4% each), "multiple simultaneous colors" and gray (both 3%), yellowish green (2%) and white (0%). This color scale is in rather close agreement with previous studies of color preferences. Eysenck (1941) tabulated the results of experiments on color preferences. The results of evaluations made by more than 21,000 subjects produced the following ranking: 1. blue, 2. red, 3. green, 4. purple, 5. orange and 6. yellow.

Perceptual constancy

A country's flag is often its most prominent national symbol. The flag is devised according to a specific pattern with specific colors and proportions. There are usually very strict rules about the times when the flag may be hoisted and lowered. Children quickly learn to recognize their country's flag. This is evident in the spontaneous drawings made by children in different countries. Yet even though most people learn to recognize their country's flag at an early age, they would probably still be incapable of supplying an exact description of the flag's appearance. But we are still capable of recognizing our flag when we see it, irrespective of the way wind may change its shape or weather conditions alter its apparent colors. Perceptual constancy generally prevails for flags and many other symbols. In our mind's eye, objects tend to retain their shape, size, brightness and colors, irrespective of the distance, angle or lighting conditions from/in which we view them.

In another experiment under my leadership, Pauckstadt (unpubl.) used an A4-sized paper to which a blue-yellow-blue strip was glued. The strip had the same colors and width proportions (5:2:9) as the Swedish flag and was equivalent to less than 4% of the area of a normal flag. The blue-yellow-blue strip inspired 91 students (65%) to think of the Swedish flag. The other 50 students in the study (35%) thought of no less than 27 different subjects. The results showed very clearly *that even a highly deformed flag symbol was often capable of generating associations with the national symbol*. There is a large degree of perceptual constancy.

Design of symbols

Quirk, Greenbaum, Leech and Svartvik (1985) notes that pictograms most reliably can substitute for words in "block language" - single word captions, headings and labels - as distinct from sentenced language. Eco (1976) suggests that the verbal equivalent of an iconic sign is nor a word but a phrase or indeed a whole story. This is also the case with the large number of Chinese kanji-characters, designating different words or sometimes phrases. The modern symbols typically found in airports and travel guides are intended to convey generalities of the same order of abstractness as words. Their characteristic graphic neutrality is perhaps the most significant aspect of their invention by the Isotype Institute (Neurath, 1936). Keates (1982) notes that discriminatory responses to map symbols depend on contrast in form, dimension, and color. The problem of discrimination is generally more critical in monochrome maps, in which only contrasts in form and dimensions are possible for lines and small symbols.

When several visual language varieties are used simultaneously the hierarchy of visibility is important. The largest symbols are always perceived first. Size is more important than form and color. It is easier to see differences between regular geometrical figures than between more complicated non-regular figures. Thus symbols are often composed of simple graphical elements, i.e. lines, circles, ovals, squares, rectangles, triangles or combinations thereof. Distinctively shaped letters are often utilized. Sutherland (1973) reaches the conclusion that symmetrical shapes are more accurately recalled by Man than non-symmetrical shapes of equivalent complexity, particularly if they are symmetrical about their vertical axis.

Symbols often employ bright colors, such a pure yellow, red, blue or green, white and black or combinations of same. According to Keates (1982) the use of color on maps introduces a large number of variables which can enhance contrast, and therefore extend the number of perceptual differences which can be employed in discrimination. The effect is to aid legibility, and therefore to increase the total range of information which the map can present.

Shape and color components are often used for designating a link or relationship between groups of messages. In traffic, for example, a triangle is used for warning signs, a circle for restriction signs and a rectangle for informative signs.

Keates (1982) notes that color is used to maximum on a map when also employed for areal symbols. The recognition of geographical features is much enhanced when areas are differentiated by hue. At the same time, complex color arrangements may raise problems in discrimination, so that although multi-color maps enlarge the graphic possibilities, they also increase the probability of errors in the judgement of discrimination. According to Keates (1982) the most common case of quantitative judgement on maps occurs in the use of proportional symbols, that is, point or line symbols constructed to represent specific quantities.

A good symbol is designed so it can be used in many different situations. For example, the McDonald's M is designed to work in every conceivable size from a few mileometers high in a brochure to more than six feet high in outdoor signs.

Use of symbols

Many pictograms are culturally biased (Mangan, 1978) and thus arbitrary to those from other cultures. For example, when using a guide-book with numerous pictographic symbols, we often have to look them up in a key in much the same way as we look up unfamiliar words in a dictionary. Their iconic origins may only become apparent after we are aware of their intended meaning (Waller, 1987). And Baron (1981) reports that iconicity is a surprisingly unimportant factor in the learning of sign-languages for the deaf, autistic or mentally retarded.

Overview

Symbols can be used for *creating an overview* and providing a holistic perspective. This property is utilized in maps and informative signs as well as in e.g. catalogues and project reports.

Instructions

Symbols can be used for *supplying instructions and information* about appropriate behaviour in different situations. Numerous examples can be found in catalogues and timetables. Various traffic signs also belong to this category.

Position

Symbols can be used for *illustrating* the spatial and geographic *position* of different objects or services. One example is the floor plan of an exhibition hall with symbols designating the location of telephones, lavatories, information booths and refreshment sites. Other examples are maps with numerous cartographic symbols for objects and conditions. Symbols can be used for illustrating size relationships and supply numerical/statistical information. Some diagrams and many symbols in maps are examples.

Representations

Symbols can be used to *represent* an organization, service or product. Trademarks and logos are utilized in marketing, advertising, public relations etc. As a rule, promotion of the representation begins with text (e.g. a company or product name), followed by text + a symbol. Ultimately the symbol alone suffices. Examples: McDonald's yellow M and Shell's scallop shell.

Different media

Symbols are employed in different media. They are static and immutable in graphical media. They may be more changeable in computer media. When you select e.g. a brush in the menu for a Macintosh drawing program, the brush icon switches from positive to reverse video. This "acknowledgement" shows the user that the command has been understood. This makes communications more "reliable".

Consistency

It can be concluded that every situation/context demands *consistent utilization of symbols*, an explanation of the symbols used and learning the meaning of those symbols.Well-designed symbols can be used and work in different cultures in different parts of the world.

References

Baron, N.S. (1981). *Speech, writing and sign*. Bloomington: Indiana University Press.

Dreyfuss, H. (1972). *Symbol Sourcebook*. McGraw-Hill Book Company.

Eco, U. (1976). *A theory of semiotics*. Bloomington: Indiana University Press.

Eysenck, H.J. (1941). A critical and experimental study of color preferences. *American Journal of Psychology*, 54, 385-394.

Itten, J. (1971). Färg och färgupplevelse. Stockholm: Norstedts.

Keates, J.S. (1982). *Understanding maps*. London and New York: Longman.

MacBeth, D.R. (1974). *Classificational preference in young children: Form or color*. Chicago: National Association for Research in Science Teaching. (ERIC Document Reproduction Service No. ED 092-362).

Mangan, J. (1978). Cultural conventions of pictorial representation: iconic literacy and education. *Educational Communication and Technology*, 26, 245-267.

Modreski, R.A., & Gross, A.E. (1972). Young children's names for matches to form – color stimuli. *Journal of Genetic Psychology*, 121, 2, 283–293.

Neurath, O. (1936). *International picture language*. London: Kegan Paul.

Otto, W., & Askov, E. (1968). The role of color in learning and instruction. *Journal of Special Education*, 2, 155–165.

Quirk, R., Greenbaum, S., Leech, G. & Svartvik. J. (1985). *A comprehensive grammar of the English language*. London: Longman.

Scüsseleder, N., & Troedsson, Å. (1988). *Användning av ikoner i datorprogram*. Undergraduate thesis. Stockholm: University of Stockholm, Department of Computer and Systems Science.

Sutherland, N.S. (1973). *Object recognition*. In E.C. Carterette and M.P. Friedman (Eds.). *Handbook of Perception, III*. New York, London: Academic Press.

Waller, R. (1987). *The typographic contribution to language. Towards a model of typographic genres and their underlying structures*. Reading: University of Reading. Department of Typography & Graphic Communication.

Ward, W.C., & Naus, M.J. (1973). *The encoding of pictorial information in children and adults*. Princeton, N.J.: Educational Testing Service. (ERIC Document Reproduction Service No. ED 085-073).

Appendix

Results of color-shape experiment

Yellow Anticipated shape: *triangle*
Heavenly bodies 99
Sun 44 (a sun was a yellow circle; several subjects wrote "sun"), sun with rays 44, star 10, half-moon 1.
Miscellaneous 3
Spike (botanical) 1, traffic light 1, sweater 1 Sub-total 102 (78%)
Geometric figures 28
Rectilinear (11): triangle 4, square 2, rectangle 2, polygon 2, jagged line 1. "Soft" (17): rounded shape 2, free shape 2, jigsaw puzzle piece 12, oval 1.
Sub-total 28 (22%)
The anticipated shape only occurred in a few instances (3%). Other shapes predominated heavily.

Red Anticipated shape: *square*
Love 56, heart 52
(the word "love" was used in a few cases), flower and heart 1, lips 2, lips and heart 1
Blood 16
(Bloodstain 8, dripping blood 8)
Miscellaneous 16
Flower 6, fire 2, house 2, leaf 1, goblin 2, goblin cap 1, traffic light 1, apple 1
Subtotal 88 (68%)
Geometric figures 42
Rectilinear (25): triangle 7, square 4, rectangle 7, hexagon 1, polygon 3, star 2, small parts 1. "Soft" (17): circle 8, circle in square 1, half-moon 1, kidney-shape 2, jigsaw puzzle piece 5.
Sub-total 42 (32%)
The anticipated shape only occurred in a few instances (3%). Other shapes predominated heavily.

Blue Anticipated shape: *circle*
Water 46
Puddle/lake 24 (several subjects wrote "water" or "lake"), undulating lines 17 (some subjects wrote the word "ocean"), drop 4, boat on water 1.
Cloud 24
Cloud 21 (blue, fair-weather clouds), cloud with rain 3
Miscellaneous 7
House 1, orienteering control marker 1, sweater 2, bed 1, eye 2
Subtotal 77 (59%)
Geometric figures 53
Rectilinear (39): straight line 1, multiple dashes 1, triangle 5, square 15, rectangle 13, polygon 3, cube 1. "Soft" (14): circle 3, oval 4, free form 2, jigsaw puzzle piece 5.
Sub-total 53 (41%)
The anticipated shape only occurred in a few instances (2%). Other shapes predominated heavily.

Green Anticipated shape: regular *hexagon*
Plants 68
Blades of grass 29, tree 16, bush 12, flower 5, leaf 5, pear 1
Subtotal 68 (52%)
Geometric figures 62
Rectilinear (32): triangle 12, square 4, rectangle 6, rhombus 2, polygon 5, star 2, volume 1. "Soft" (30): circle 5, oval 4, free form 1, jigsaw puzzle piece 19, spiral 1.
Subtotal 62 (48%)
The anticipated shape was never used.

White Anticipated shape: *semicircle*

Clouds 23
  Clouds 20 ("fair weather clouds"), clouds with rain 1, fog 2 (diffuse area with the caption "fog")
Snow 20
  Snow 6, snowballs 4, snowman 7, snow crystals 2, snow on house 1
Miscellaneous 10
  Flower 3, book spread 1, dress 2, pillow 1, milk carton 1, teeth 1, ghost 1

Subtotal 54 (42%)

Geometric figures 76
  Rectilinear (39): triangle 4, square 6, rectangle 12, polygon 5, star 12. "Soft" (37): circle 10, oval 4, free form 9, jigsaw puzzle piece 14.

Sub-total 76 (58%)

The anticipated shape was never used.

Black Anticipated shape: *parallelogram*

Death/grief 10
  Skull 1, coffin 1, cross 6, grief (black area with caption "grief") 1, atomic bomb cloud 1
Miscellaneous 25
  Face 2, drop 2, bird 1, hat 1, cat 1, cloud with lightning 1, night (black area with caption "night") 5, briefcase 1, smoke 2, snuff box 2, starry sky 1, black cloud 5, TV set 1, winter tire 1

Subtotal 35 (27%)

Geometric figures 95
  Rectilinear (75): line 2, jagged line 2, triangle 10, rectangle 30, square 11, rhombus 1, hexagon 1, polygon 18. "Soft" (20): semicircle 1, circle 5, kidney shape 1, free form 7, jigsaw puzzle piece 6

Sub-total 95 (73%)

The anticipated shape was never used.

Results of shape-color experiment

The percentile distribution of the colors used when 157 students colored different shapes.

Color	Triangle	Star	Square	Rectangle	Circle	Puzzle piece	MEAN
Yellow	5	34	3	6	12	6	11
Orange	13	22	5	8	9	6	10
Red	12	12	15	7	22	22	15
Purple	14	7	14	13	15	20	14
Blue	13	6	32	13	15	17	16
Greenish blue	6	3	0	4	6	3	4
Green	13	5	9	16	11	16	12
Yellowish green	3	0	0	3	3	4	2
Brown	4	3	9	13	3	1	6
Black	9	2	6	6	2	0	4
White	1	0	0	0	0	0	0
Gray	3	2	2	7	2	1	3
Multiple colors	3	4	4	3	1	4	3

Results of constancy experiment

A total of 141 upper-level comprehensive school students participated in Pauckstadt's study: 91 subjects (64.5%) reported associations with the Swedish flag. The remaining 50 subjects (35,5%) reported the following 27 different associations:

"That's the way it looks" 1, loneliness 2, airplane wing 1, horizon 1, high jump bar 1, ice hockey 1, clock from the side 1, candle 3, light diffraction 2, light and prism 1, part of the moon 1, darkness 3, supernatural being 2, infinity 2, lake with jetty 1, sun and water 1, sunset 2, sunrise 3, crack 1, slot 1, line 9, turning off TV 1, train 1, water with yellow boat 1, wave 1, road with car 3 and road at night 3.

EFFECTS OF FLOW DIAGRAMS AND TEXTS WITH INSTRUCTIVE QUESTIONS ON LEARNING VERBAL CHAINS

Robert C. Branch
David M. Moore

Can logical relationships that have been clearly established in textual terms be presented equivalently in diagrams? If so, what is the effect on student comprehension or a learners ability to remember sequences (verbal chains) when diagram technology is employed together with instructive questions? According to Larkin and Simon (1987), people distinguish diagrammatic from sentential [texts] representations of information by developing alternative models of information-processing systems that are informationally equivalent and that can be characterized as sentential or diagrammatic. *Sentential* representations are sequential, like the propositions in texts. *Diagrammatic* representations are indexed by location in a plane. The theses of this study are that flow diagrams are a more effective presentation type for cyclical information than texts, and that each presentation type, when used in conjunction with instructive questions, will enhance the learning of verbal chains. The purpose of this study, therefore, was to evaluate the potential of flow diagrams and texts to teach verbal chains, and the ability of instructive questions to act as prompts or as information organizers.

Need for the Study

Research on diagrams is important for two reasons. First, most of the messages transmitted by electronic media are print oriented (Jonassen, 1982). For example, two of the primary instructional applications of computers are word processing and text presentation in the tutorial mode. Second, there is a resurgence of interest in print materials, based upon the increasing importance of cost effectiveness as a selection criterion for instructional materials. Thus, instructional technology is refocusing its concerns on the internal structure and design of instructional materials, rather than the medium of transmission (Clark, 1983; Jonassen, 1982).

A problem is that the effectiveness of visual materials as a component of a meaningful learning strategy is said to be obscured due to a need for standardization among visual materials (Clark, 1983; Clark & Angert, 1980; Dwyer, 1978; Heinich, 1984). The concept of standardization among visual materials can be realized once educators are able to select visual materials based on their attributes. The attributes of diagrammatic presentations are relatively well defined and the benefits of using instructive questions is also outlined rather implicitly in research literature. However, no categorical recommendation about the use of flow diagrams can be made at this time because of the lack of diagram theory development and subsequent research in this area. Further, research should help clarify the potential utility of flow-diagram-based instruction. According to Holliday (1976), "if the terminal behavior includes concept attainment, the placement of a flow diagram with questions before or after a verbal discussion of the concepts might prove to constitute an effective instructional package" (p. 75). Therefore, it is recommended that instructional designers more seriously consider and investigate the use of flow diagrams with instructive questions as an instructional medium.

Charts, graphs, and diagrams comprise a family of graphic forms that have in common the attributes of abstraction and the exploitation of space. Charts illustrate relationships among categorical variables; graphs show relationships between individual variables; and diagrams describe whole processes often at levels of greater complexity than charts or graphs (Winn, 1987).

Holliday (1976) noted that the basic difference between flow diagrams and textual descriptions was the manner of linking the sequential chains together. In flow diagrams, the connecting words which provide structural coherence among concepts in a text are replaced with a condensed and spatially integrated display of line drawings or block figures and design elements, thereby increasing the opportunity of mental linkage formation among verbal labels.

Definitions

A Flow Diagram is a graphic design, composed of descriptive texts, or pictures, or both. Flow diagrams present sequence, identify relations, such as parts to a whole, and explain, rather than represent. A diagram is defined here as evidence of an idea being structured -- it is not *the idea* but a model of it, intended to clarify characteristics of features of that idea. A diagram is a form of communication which increases the pace of development, or allows an idea to function and develop for the thinker while offering the possibility of transfer of an idea or triggering of notions: through appropriate structuring, it may generate different notions and states of mind in the viewer (Dwyer & Dwyer, 1989). Holliday (1975) suggested that flow diagrams are especially helpful for recalling components of a pathway or a cyclic schema and for getting the "big picture" at a glance. A chain of words in the texts (detailing for instance the steps in a metabolic pathway) can also provide the basis for such recall. Holliday hypothesized that a single flow diagram can teach more effectively than either a text description or combination of texts and diagram.

Instructive Questions are questions that are designed to facilitate information organization and serve as adjuncts to presentation types. Two of the four treatment groups in this present study received instructive questions to answer as they studied the presentation material. The instructive questions serve as prompts or information organizers for the content to be learned form the diagram or the texts.

Verbal Chains are specific response associations (Stimulus-Response). Verbal chaining is contingent upon three conditions: "(a) the number of inputs are limited and the stimulus is presented under conditions commanding attention, (b) the response required of the learner is contiguous in time, and (c) the reinforcement as to the correctness or incorrectness of the response is immediate, and correctness procedures are implemented immediately if the initial response is incorrect" (Dwyer & Dwyer, 1989, p. 1). Under these conditions visualization is useful in assisting learners to acquire the basic data-units of information processing -- facts. Gropper invented the term verbal chaining in his 1970 study on diagram types to describe how the probability of responding is increased. Holliday (1976) adopted the term verbal chaining to compare the teaching effectiveness between flow diagrams and texts.

Research Questions

Past visual experiments varied the information contained within the visual, however, this present study varied the information outside the visual. Because the question of the effectiveness of pictures as a medium of communication in instruction is complex, only one factor of pictorial display (flow diagram) was investigated in this study. Flow diagrams are especially helpful for recalling components of a pathway or a cyclic schema and for getting the "big picture" at a glance (Holliday, 1975). Flow diagrams with instructive questions are an effective instructional medium as suggested by Holliday (1976). Although Gropper (1970) and Spangenberg (1971) indirectly support Holliday's (1976) flow diagram with instructive texts theory, and further contend that a flow diagram represents a more effective instructional medium than a text description explaining the same verbal chains, the evidence is inconclusive. Gropper (1970) found that a variety of diagrams with instructive questions was a better learning achievement package than an undefined conventional instruction based on the same objective. Therefore, by utilizing identical information, but, in a textual format, we should be able to more clearly define the attributes associated with pictorial displays. Spangenberg (1971) found that pictorial display groups in controlled experiments performed better than textual display groups due to the degree of integration attributable to pictorial displays. Thus, presenting the main issue that this current study seeks to resolve, that is, are diagrams better than text descriptions when learning verbal chains.

The results of Holliday's (1976) study did not demonstrate that flow diagrams are better than text descriptions. He concluded that an alternative variable such as the use of instructive questions could produce significant differences in the use of flow diagrams when learning verbal chains. Therefore, it is reasonable to assume that a flow diagram of verbal chains can be an effective instructional medium in terms of verbal chaining behaviors related to instructive questions.

The three major questions are: (1) What is the effect of presentation type (diagram or text) on verbal chain learning?, (2) What is the effect of instructive questions as an adjunct to the presentation type on learning verbal chains? and (3) Do interactions occur across presentation type (Diagram and Text) with the use of instructive questions?

Methodology

The participants in this experiment consisted of 129 college students were randomly assigned to one of the four treatment groups. Each participant was asked to study a flow diagram or a text passage, with or without instructive questions, and to take a comprehension test on its content. The first treatment condition (Text Only) required the participants to read a passage composed only of prose which described verbal chains of information. The second treatment condition (Diagram Only) required the participants to study a flow diagram presenting the same verbal chains as the text only condition. The third treatment condition (Text with Instructive Questions) required the participants to answer the instructive questions as they read the textual passage. The fourth treatment condition (Diagram with Instructive Questions) required the participants to answer instructive questions as they studied the flow diagram.

The flow diagram used in this study was a replica of the flow diagram used in previous studies by Holliday (1976, 1981, 1983) which described four, related, scientific pathways or cyclical schemes (see Figure 1). The text passage contained the same information as presented in the diagram. A textual description of the same linkages was typically restricted to the use of nouns, verbs and modifiers and presented in sentence form. An excerpt of the three page text passage is presented in Figure 2. The list of instructive questions used in two of the four treatments was of the "fill-in-the-blank" variety and served as an adjunct or prompt to the diagram or text presentations. The comprehension test (dependent variable) consisted of 24, four-choice items and constituted a content synthesis of two or more of the units displayed in the diagram or presented in the texts.

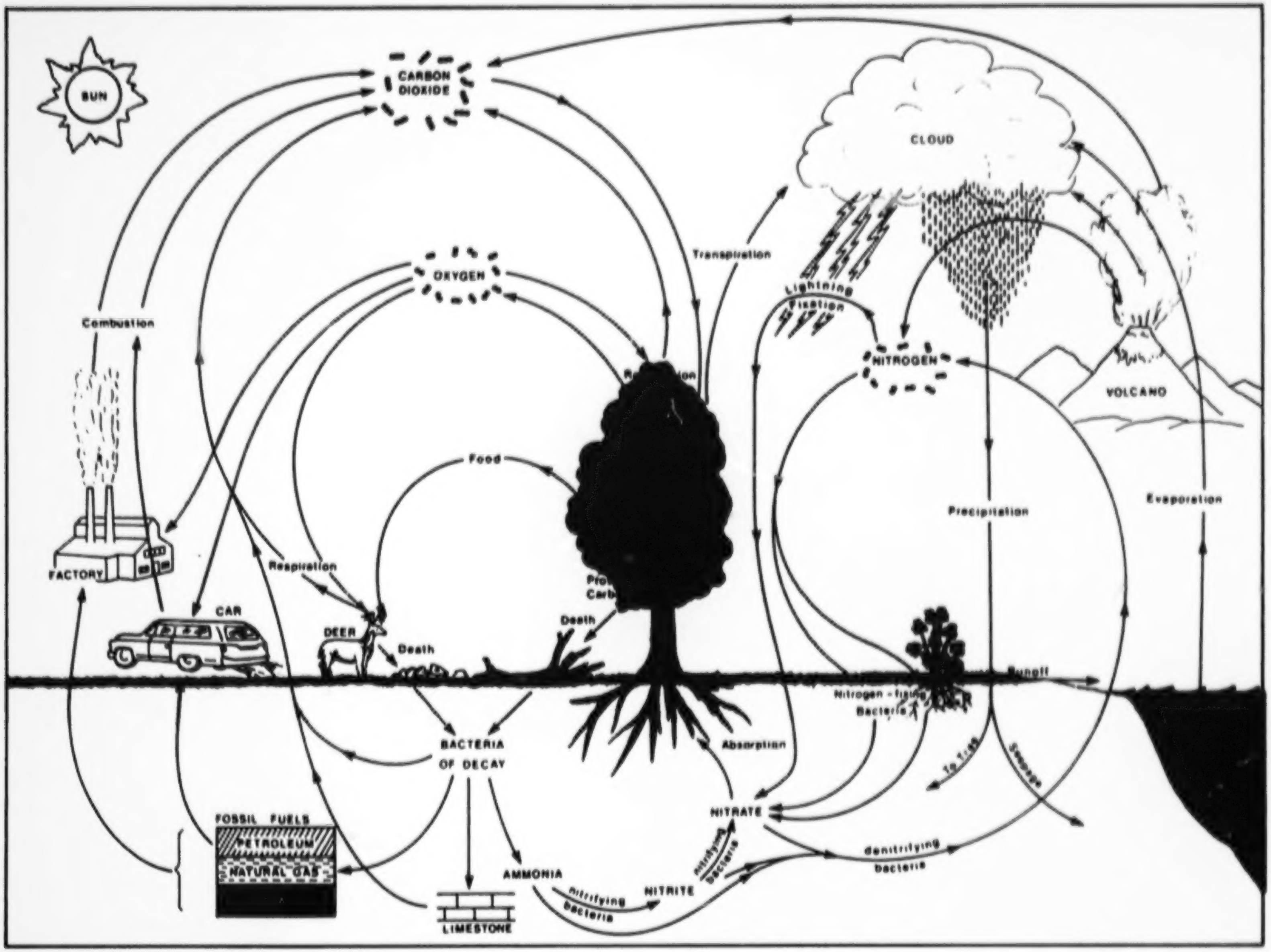

SUN
CARBON DIOXIDE
CLOUD
Transpiration
Combustion
OXYGEN
Lightning
Fixation
NITROGEN
Respiration
VOLCANO
Food
Evaporation
Precipitation
Respiration
FACTORY
Protein
Carbohydrate
CAR
DEER
Death
Death
Runoff
Nitrogen-fixing Bacteria
To Tree
Seepage
BACTERIA OF DECAY
Absorption
NITRATE
FOSSIL FUELS
PETROLEUM
NATURAL GAS
denitrifying bacteria
AMMONIA
nitrifying bacteria
NITRITE
nitrifying bacteria
LIMESTONE

Figure 7.

From "Teaching Verbal Chains Using Flow Diagrams and Texts" by W.G. Holliday, 1976, AV Communication Review, 24, P. 69. Copyright 1976 by Author. Adapted by permission.

Biogeochemical Cycles

Clouds form when moisture in the air condenses on small particles of dust or other solid particles in the air. Moisture from trees and other plant (**transpiration**) form the clouds. Water vapor that condenses and forms clouds often falls to the earth in the form of rain, sleet, snow, or hail. Water that falls from the atmosphere to the earth is called **precipitation**. Some water that falls to the earth goes into the ocean through **runoff**. Some water goes into the ground as **seepage**. Trees and other forms of plant life use the water.

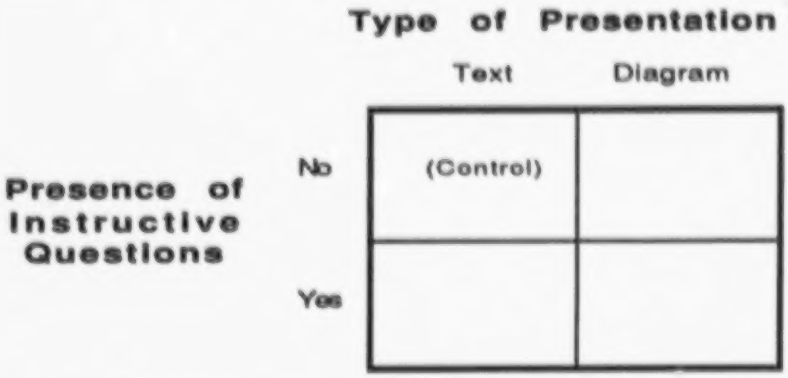
Oceans play an important part in the hydrologic cycle. During this cycle, the sun's rays heat the surface of the ocean, causing the water to enter the atmosphere as water vapor (**evaporation**). Seepage and runoff replenish the water of the ocean.

Oxygen in the air contributes to the functioning of trees (plant life), and deer (animal life), through respiration, and by cars (machinery) and factories (industry) through combustion. Plant life provides the main source of oxygen in the air through the process of photosynthesis. While oxygen contributes to the functioning of trees, deer, cars and factories, these same things add **carbon dioxide** to the air. Carbon dioxide is absorbed by trees and other plant life during photosynthesis.

Figure 2. Excerpt of the three-page text passage. The text passage was used as a single treatment condition and as part of a second treatment condition.

The content accuracy and the degree of information equivalency of the instruments used in this study were validated by a panel of four experts who have taught in the field of Earth Science. The individuals on the panel represented a cumulative teaching experience of 67 years at either high school or college level. The comprehension test produced a Kuder-Richardson reliability coefficient of 0.531.

This experiment used two independent variables: (1) *Presentation Type*, and (2) *the Presence of Instructive Questions*. There was a single dependent variable, the mean score achieved on the comprehension test. This experiment used a posttest-only equivalent group design. The data collected from the participants was analyzed using a 2 X 2 factorial analysis design. An Analysis of Variance (ANOVA) was used to determine statistical significance [Alpha = .05]. Figure 3 illustrates the research design.



The dependent variable is the comprehension test score.

Figure 3. 2 X 2 Factorial Design

Results

The results of the analyses indicated the following:

1. Diagrams are a more effective presentation type than texts.
2. Instructive questions do not enhance learning effectiveness as an adjunct to the two presentation types.
3. There was no differential advantage between presentation type and the use of instructive questions.

Table 1 provides a summary of the mean scores, standard deviations and number of subjects across all treatment groups. Table 2 contains the summary of the 2 X 2 factorial analysis of variance.

Table 1

Summary Table of Means and Standard Deviations by Main Effects N = 129 X = 16.74

Group	n	Mean	SD
Presentation Type			
Diagram	64	17.81	2.81
Text	65	15.69	2.43
Instructive Questions			
With	64	16.11	2.66
Without	65	17.37	2.86
Text Only	33	16.06	2.09
Diagram Only	32	18.72	2.86
Text with Instructive Questions	32	15.31	2.65
Diagram with Instructive Questions	32	16.91	2.36

Note: Maximum possible score = 24.

Table 2

Summary ANOVA Table of Presentation Type and Presence of Instructive Questions

	DF	SS	MS	F	p
Presentation Type	1	145.73	145.73	22.436	.0001**
Instructive Questions	1	52.85	52.85	8.137	.0051*
Interaction	1	9.13	9.13	1.406	.2380
Error	125	811.94	6.50		

* $p < .01$
** $p < .001$

Figure 4 is a graphic presentation of the mean scores for each of the treatment groups.

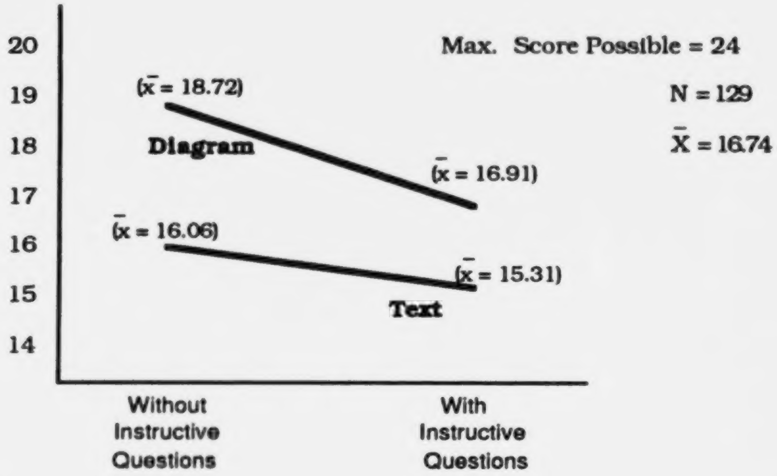


Figure 4. Graph of Main Effects Means.

These results strongly support Holliday's (1976) study of flow diagrams as an effective medium when teaching verbal chains. The first hypothesis of the present study, that flow diagrams are more effective than texts when presenting cyclical information, is accepted. An explanation for this occurrence is that flow diagrams have as a primary attribute the ability to present spatial relationships of entities which reinforce a predicted response (Dwyer & Dwyer, 1989). "We know visualization is capable of: stimulating curiosity, facilitating organization, illustrating data, focusing attention, clarifying information, stimulating interest, raising questions, spanning linguistic barriers, facilitating retention of information, increasing communication reliability, isolating learning cues, facilitating discrimination, introducing new information and initiating discussion" (Dwyer & Dwyer, 1989, p. 2).

The results for this study also favor the overprompting theory (Anderson & Faust, 1967; Anderson, Faust & Roderick, 1968; Faust and Anderson, 1967; Holliday, 1981,1983) which basically states that providing students with strong hints to the answers of questions can do more harm than good. The second hypothesis of the present study which states instructive questions enhance learning effectiveness of the presentation type (diagram or text) is rejected. The data in this study indicated that student comprehension of verbal chains is inhibited when diagrams are employed together with instructive questions. From the results of the present study, consistent with Holliday's (1981) findings, it is recommended that researchers and teachers be cognizant of the fact that encouraging students to focus selective attention on a sampling of criterial information can result in inadequate processing of such specialized instructional materials as flow diagrams. The use of adjunct questions with flow diagrams is worthy of further investigation with regard to how adjunct questions can be incorporated into instructional methods without interfering with the way students generally study content information.

Post-experiment interviews revealed that the participants desired to write study notes on the self-instructional materials, but, did not do so because the instructions to participants were not explicit in this direction and because the materials seemed so "neat," "clean," "formal," "organized" and "just too pretty to write on." Future investigations of this nature should address this issue. Another example of how adjunct questions could be better incorporated into instructional methods is to provide additional time for those required to study the diagram or text and write in the answers to the instructive questions.

Conclusions

Media-related researchers need to continue to develop the "broad picture" of flow diagram use in instruction. Diagram type, such as picture-word diagrams (Spangenberg, 1971) or block-word diagrams (Gropper, 1970), diagram complexity, such as word-picture ratio, and diagram resolution are considerations for future research on diagrams.

While we live in an age of visual media, few people learn graphic techniques that apply graphically literate layout strategies. Overhead transparencies, page layouts and bulletin boards usually present a flow of words down the page in straight text or outline form. There is a need to practice more enlightened visual strategies in the classroom by maximizing the use of diagrams (Weisberg, 1970).

Despite the widespread and increasing use of instructional graphics empirical support is needed that will enable diagrams to be effective as a medium on the basis of their instructional qualities rather than on their decorative qualities (Bates, 1981). Flow diagrams have generally been designed to supplement visually the information presented in texts. We must begin to interpret flow diagrams as an integrated component of a total learning strategy. More evaluation and analysis is still required on how verbal-visual relationships and prior knowledge affect diagram effectiveness. A more informed theoretical understanding of how learners with different levels of prior knowledge relate to varying amounts of descriptive text in diagrams will assist media-related researchers in forming clear criteria for designing efficient diagrams.

References

Anderson, R. C., & Faust, G. W. (1967). The effects of strong formal prompts in programmed instruction. American Educational Research Journal, 4, 345-352.

Anderson. R. C., Faust, G. W., & Roderick, M. C. (1968). "Overprompting" in programmed instruction. Journal of Educational Psychology, 59, 88-93.

Bates, T. (1981). Toward a better research framework for evaluating the effectiveness of educational media. British Journal of Educational Technology, 12, 215-233.

Clark, R.E. (1983). Reconsidering research on learning from media. Review of Educational Research, Winter, 53(4), 445-459.

Clark, R.E., & Angert, J.F. (1980). Inadequacies in media research. Instructional Innovator, 25, 1, 36-37.

Dwyer, C. A., & Dwyer, F. M. (1989). Improving visual learning: Strategies and procedures. Paper presented at the Annual Conference of the Association of Educational Communications and Technology, Dallas, Texas, February.

Dwyer, F. M. (1978). Strategies for improving visual learning. State College, Pennsylvania: Learning Services.

Faust, G. W., & Anderson, R. C. (1967). Effects of incidental material in a programmed Russian vocabulary lesson. Journal of Educational Psychology, 58, 3-10.

Gropper, G. L. (1970). The design of stimulus materials in response-oriented programs. AV Communication Review, 18, 129-159.

Heinich, R. (1984). The proper study of instructional technology. Educational Communications and Technology Journal, 32, 67-87.

Holliday, W. G. (1975). What's in a picture? Science Teacher, 42, 10, 21-22.

Holliday, W. G. (1976). Teaching verbal chains using flow diagrams and texts. A V Communication Review, 24, 63-78.

Holliday, W. G. (1981). Selective attentional effects of textbook study questions on student learning in science. Journal of Research in Science Teaching, 18 (4), 283-289.

Holliday, W. G. (1983). Overprompting science students using adjunct study questions. Journal of Research in Science Teaching, 20 (3), 195-201.

Jonassen, D. H. (1982). Advance organizers in text. In D. Jonassen (ed.), The technology of text: Principles for structuring, designing, and displaying text, (Vol. 1. pp. 253-275). Englewood Cliffs, New Jersey: Educational Technology Publications.

Larkin, J. H., & Simon, H. A. (1987). Why a diagram is (sometimes) worth ten thousand words. Cognitive Science, 11, 65-79.

Spangenberg, R. W. (1971). Structural coherence in pictorial and verbal displays. Journal of Educational Psychology, 62, 514-520.

Weisberg, J. S. (1970). The use of visual advance organizers for learning earth science concepts. Journal of Research in Science Teaching, 7, 161-165.

Winn, W. D. (1987). Charts, graphs, and diagrams in educational materials. In D. M. Williams & H. A. Houghton. (Eds.), The psychology of illustration, (Vol. 1). New York: Springer-Verlag.

THE EFFECT OF GRAPHIC FORMAT ON THE IMMEDIATE AND DELAYED INTERPRETATION OF QUANTITATIVE DATA

(Phase II)

J. Thomas Head
David M. Moore

The rapid improvements in hardware and software for the production of computer graphics have provided the user with the capability to prepare graphic materials easily and quickly. As a result, graphics for instructional applications have shown a dramatic improvement and are approaching professional quality. But, are educators and instructional designers using the "right" type of graphics to convey information? The use of graphics in instruction has generally been recommended in the literature (e.g., Miller, 1969; Shostack & Eddy, 1971; Takeuchi & Schmidt, 1980). However, few studies have been conducted to test the effectiveness of different types of graphics on the interpretation of quantitative data intended by the designer.

MacDonald-Ross (1977) indicates that there are three questions to ask when developing quantitative data presentations: 1) What data to present?, 2) Which format would be the best and 3) How to present that format competently? The format of data which is presented is selected from a variety of possibilities. At times data presentation formats are selected with thought and sometimes without any rationale. "One is constrained by the data one is working with, and by the likely impact of the message on the reader. Having a purpose enables the writer to select between those alternatives which are legitimate and workable" (p. 361).

Watson and Driver (1983) state that important variables to judge the value of a graphic presentation include understanding the data, prior knowledge, comprehension and "degree of appeal to the interest of user." The general advantages of graphics in presentations have also been delineated by Watson and Driver (1983). Some of these advantages include the ability 1) to create interest in the user, 2) to aid in grasping relationships, 3) to save time when viewing masses of data, 4) to provide at a glance a comprehensive view of the relationship between different categories of information, and 5) to assist in analytical thinking. However, there appears to be a lack of research that supports the above claims. Winn (1987, p. 192) stresses the importance of "developing lines of inquiry into the learning strategies students use when working with graphic forms." It is important to discover how and what students learn from graphics. Are some graphics more effective than others? Are some types of information better presented by different graphic formats?

Head and Moore (1989) investigated the effects on interpretation of presenting numerical data in four different graphic formats: bar graph, line graph, table and line-table. Three types of quantitative recall were tested: questions dealing with specific amount, static, and dynamic comparisons (Washburne, 1927). Their results indicated that both main effects, type of graph and type of question, were significant, however, no interaction was present. This study suggested the possibility of testing with additional data points and of determining the effects on immediate and delayed recall.

Therefore, the purpose of this study is to determine if increasing the amount of data in different graphic formats, i.e., line graphs, bar graphs, table, and line-table charts, affects the interpretation of quantitative information. The effects of these formats will be tested by asking three types of questions: amount, static, and dynamic regarding the data presented. In addition, both immediate and delayed recall of relationships in the data will be measured by asking questions in the absence of the stimuli. It is also of interest to determine if there is an interaction between graphic format and type of question. This study is a *partial replication and expansion* of the study of Head and Moore (1989). The present study increased the amount of data presented by a factor of 2 and introduced the comparison of immediate and delayed recall in the absence of the graphic stimuli over the previous study.

The specific research questions generated for this study are as follows.

1. What is the effect on interpretation of presenting numerical data in different chart-graph formats?
2. Is there any interaction between the type of graph and the type of questions asked?
3. What is the effect of increasing the amount of numerical data presented?

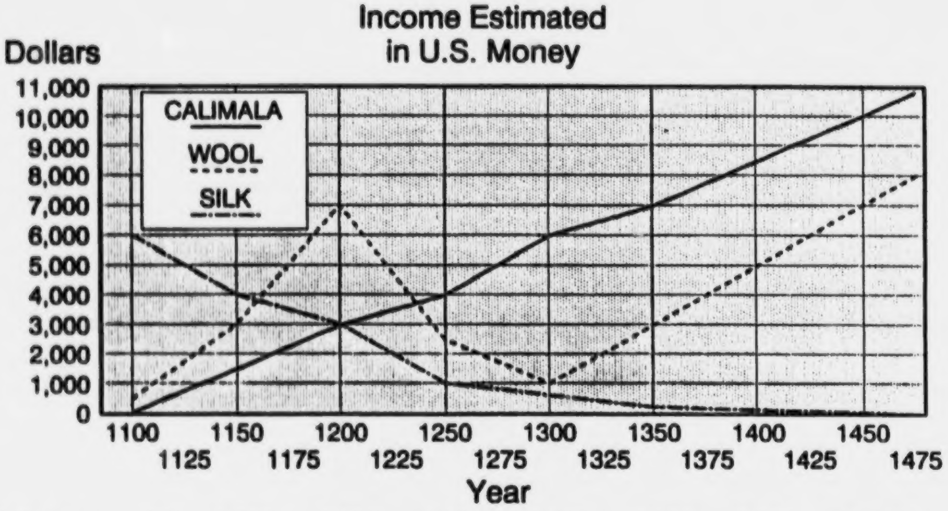
Methodology

Subjects

The subjects of this study were 123 college students enrolled in professional education classes or introductory educational psychology classes in a large, land grant university.

Procedures

The subjects were randomly assigned to one of four treatments which were presented fictitious data in four different graphic formats: 1) bar graph, 2) line graph, 3) table, and 4) line-table chart. The data used to prepare the graphic stimuli were the same for all four treatments and was adapted from the Head and Moore (1989) study (see figures 1 and 2 for examples). The data presented in this study contained twice the data points in all four types of graphs of the earlier 1988 study. These more complex graphs contained data at the maximum readability level for projected graphs.



Calimala	50	1,500	3,000	4,000	6,000	7,000	8,500	10,000
Wool	500	3,000	7,000	2,500	1,000	3,000	5,000	7,000
Silk	6,000	4,000	3,000	1,000	600	200	100	20

Calimala	800	2200	3500	5000	6500	7800	9300	10,800
Wool	1800	5000	4800	1800	2000	4000	6200	8000
Silk	5000	3500	2000	800	400	150	60	0

Figure 1

**Income Estimated
in U.S. Money**

Year	Dollars		
	Calimala	Wool	Silk
1100	50	500	6,000
1125	800	1800	5,000
1150	1,500	3000	4,000
1175	2,200	5000	3500
1200	3,000	7000	3000
1225	3,500	4800	2000
1250	4,000	2500	1000
1275	5,000	1800	800
1300	6,000	1000	600
1325	6,500	2000	400
1350	7,000	3000	200
1375	7,800	4000	150
1400	8,500	5000	100
1425	9,300	6200	60
1450	10,000	7000	20
1475	10,800	8000	0

Figure 2

Each treatment group was given questions on the content of the graphs and charts. There are four types of questions: 1) Specific amount, e.g., how much, how many? 2) Static comparison, e.g., which? 3) Dynamic comparisons, e.g., which increased (decreased) most rapidly?, and 4) Imagery, which asked about trends and general concepts. All students in the treatment groups answered the same 56 questions (14 each in the above four categories).

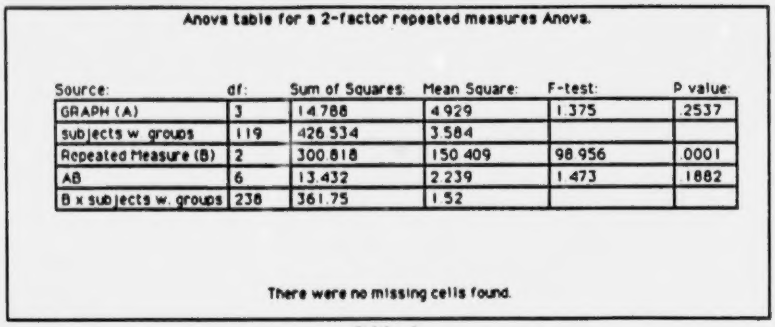
The subjects were given a fictitious narrative and then shown a specific graphic stimuli, e.g., line graph on a 35mm slide, and presented 42 questions (amount, static and dynamic comparisons) with 7 seconds to respond to each question while looking at the treatment slide. The students then were instructed to study the graphic on the screen for 60 seconds and were then asked 14 "imagery" questions about trends and general concepts. One week later students were tested using the same imagery questions without viewing the graphic.

Analysis

A two-way analysis of variance was used in which the independent variables were type of graphic and type of questions. The design was a 4 x 3 design based upon a mixed model and used a combination of between and within subjects methods (all subjects would respond to all types of questions). A second analysis was conducted using a two-factor repeated measure ANOVA to investigate effects of the types of graphs vs. the "imagery" questions (Part Two) and the delayed "imagery" questions. The dependent variable was the test score which measures the interpretation of the quantitative data presentation.

Results

A 4 x 3 analysis of variance with repeated measures was used to test the research questions concerning the type of graph and type of questions. The main effect means are found in Table 2. The summary table (1) indicated that the F ratio for the type of graph was not significant ($F(3,119) = 1.38, p > .05$). The second main effect type of graph showed a significant difference in means ($F(2,238) = 98.96, p < .05$). The results from Table 1 indicated that there was no interaction between these main effects ($F(6,238) = 1.47, p > .05$.

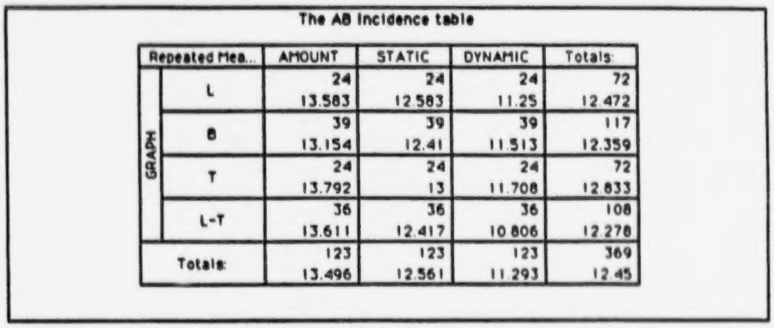


Anova table for a 2-factor repeated measures Anova.

Source:	df:	Sum of Squares:	Mean Square:	F-test:	P value:
GRAPH (A)	3	14.788	4.929	1.375	.2537
subjects w. groups	119	426.534	3.584		
Repeated Measure (B)	2	300.818	150.409	98.956	.0001
AB	6	13.432	2.239	1.473	.1882
B x subjects w. groups	238	361.75	1.52		

There were no missing cells found.

Table 1

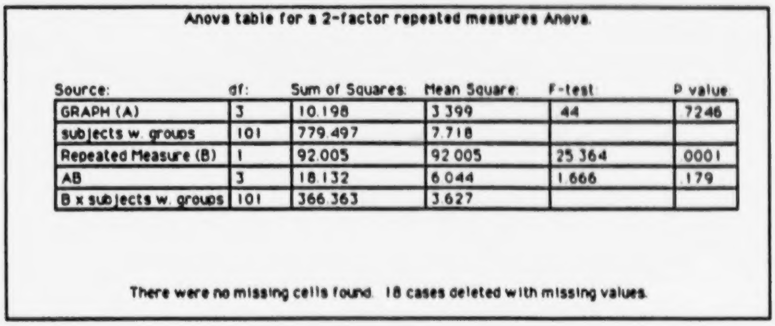


The AB Incidence table

Repeated Mea...		AMOUNT	STATIC	DYNAMIC	Totals:
GRAPH	L	24 13.583	24 12.583	24 11.25	72 12.472
	B	39 13.154	39 12.41	39 11.513	117 12.359
	T	24 13.792	24 13	24 11.708	72 12.833
	L-T	36 13.611	36 12.417	36 10.806	108 12.278
Totals:		123 13.496	123 12.561	123 11.293	369 12.45

Table 2

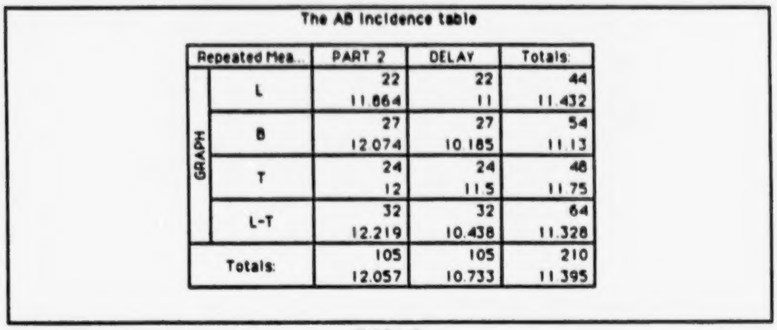
A second analysis was conducted testing the effects of type of graph against the "imagery" test and the delayed "imagery" test conditions. This analysis used a 4 x 2 analysis of variance using repeated measures (imagery conditions). As in the first analysis the main effect of the type of graph was not significant (F(3,101) = .44, p > .05. The time of test conditions showed significant difference in means (F(1,3) = 25.36, p < .05). As in the first analysis, there was no significant interaction between the main effects (F(3,101) = 1.67, p > .05). Table 3 presents the means of this analysis.



Anova table for a 2-factor repeated measures Anova.

Source:	df:	Sum of Squares:	Mean Square:	F-test:	P value:
GRAPH (A)	3	10.198	3.399	.44	.7246
subjects w. groups	101	779.497	7.718		
Repeated Measure (B)	1	92.005	92.005	25.364	.0001
AB	3	18.132	6.044	1.666	.179
B x subjects w. groups	101	366.363	3.627		

There were no missing cells found. 18 cases deleted with missing values.



The AB Incidence table

Repeated Mea...		PART 2	DELAY	Totals:
GRAPH	L	22 11.864	22 11	44 11.432
	B	27 12.074	27 10.185	54 11.13
	T	24 12	24 11.5	48 11.75
	L-T	32 12.219	32 10.438	64 11.328
Totals:		105 12.057	105 10.733	210 11.395

Table 3

An additional analysis was conducted to test if there was a difference in the earlier 1988 results (Head and Moore, 1989) and the present study across the dynamic question form. Using a one way ANOVA the F ratio indicated that the 1988 results were significantly higher for the line-table condition ($F(1,58) = 33.61$, $p < .05$). See Tables 4, 5, 6 for these results of this analysis. Figure 3 illustrates the difference of the means for the 1988 and 1989 study.

One Factor ANOVA X_1 : YEAR Y_1 : DYNAMIC L-T

Analysis of Variance Table

Source:	DF:	Sum Squares:	Mean Square:	F-test:
Between groups	1	33.611	33.611	8.985
Within groups	58	216.972	3.741	p = .004
Total	59	250.583		

Model II estimate of between component variance = 1.037

Table 4

One Factor ANOVA X_1 : YEAR Y_1 : DYNAMIC L-T

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
88	24	12.333	1.373	.28
89	36	10.806	2.227	.371

Table 5

One Factor ANOVA X_1 : YEAR Y_1 : DYNAMIC L-T

Comparison:	Mean Diff.:	Fisher PLSD:	Scheffe F-test:	Dunnett t:
88 vs. 89	1.528	1.02*	8.985*	2.997

* Significant at 95%

Table 6

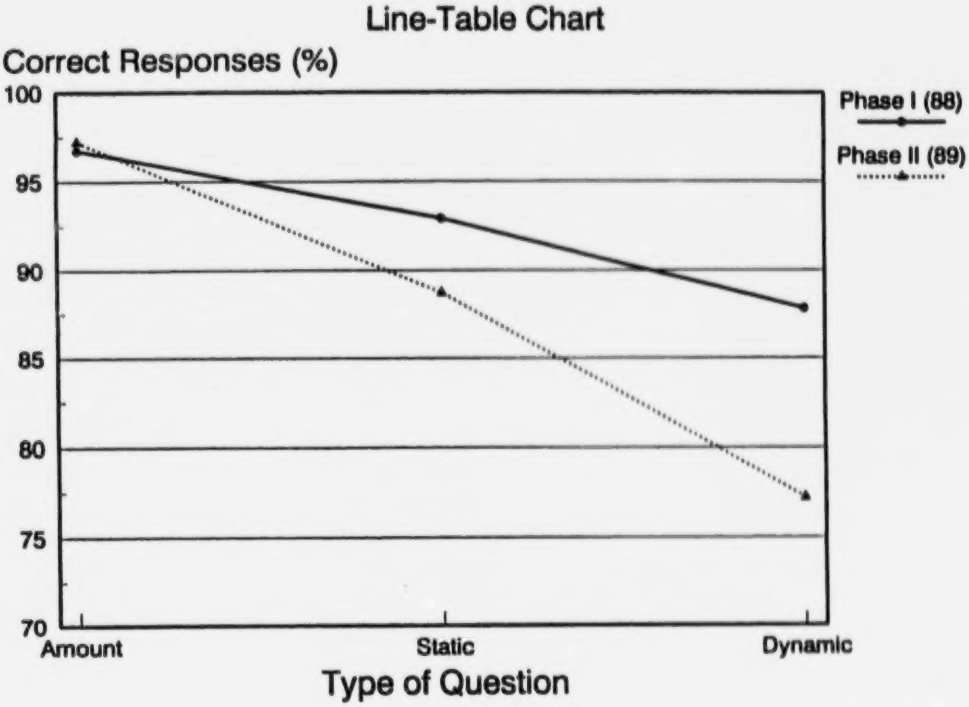


Figure 3

Discussion

One of the main purposes of this study, which was an extension of a previous study by Head and Moore (1989), was to determine the effects of increased data complexity on the interpretation of quantitative data. The earlier study indicated that there was a significant effect for the type of graph. Increasing the amount of data did eliminate the main effect of type of graph found in the previous work. This was due primarily to the decreased performance of subjects in the table condition which resulted in no differences between the various chart types. Additional data obviously adversely affected the interpretation of graphic data used in this study. The main effect for type of question was a predicted result because the amount, static, and dynamic questions obviously differ in difficulty in the order found in this study and in the earlier study.

The difference in the scores for Part Two ("imagery") and Delayed ("imagery") condition was predicted because of the usual effect of time on a recall task. However, the relatively high scores in the delayed condition was unexpected. This result could be due to overlearning during Part One of the experiment or could be due to the effects of imagery instructions given during Part Two or a combination of both. The conditions of this study do not provide a means to interpret which of these effects or what combination of the two are responsible for the relatively high scores in the delayed recall group. Future studies of this type could provide appropriate control groups which did not receive imagery instructions. This would provide some insight into the mechanisms which are at work here.

One other result which was of interest was the difference of the scores on the dynamic questions for the line-table condition as a function of data complexity (cf. 1988 and 1989 study). The group viewing the more complex graph (twice the data available) had lower scores, which is a predicted result given the difficulty of interpreting the dynamic questions.

References

Benbasat, I. & Dexter, A.S. (1986). An investigation of the effectiveness of color and graphical information presentation under varying time constraints. *MIS Quarterly*, March, 59-81.

Head, T.J. & Moore, D.M. (1989, February). *The effect of graphic format on the interpretation of quantitative data*. Paper presented at the meeting of the Association for Educational Communication and Technology.

MacDonald-Ross, M. (1977). How numbers are shown: A review of research on the presentation of quantitative data in texts. *AVCR*, 25(4), 359-410.

Miller, I.M. (1969). Computer graphics for decision making. *Harvard Business Review*, 47(6), 121-132.

Shostack, K. & Eddy, C. (1971). Management by computer graphics. *Harvard Business Review*, 49(6), 52-63.

Takeuchi, H. & Schmidt, A.H. (1980). New promise of computer graphics. *Harvard Business Review*, 58(1), 122-132.

Washburne, J.N. (1927). An experimental study of various graphic, tabular and textual methods of presenting quantitative material. *The Journal of Educational Psychology*, 18, 361-376.

Watson, C.J. & Driver, R.W. (1983). The influence of computer graphics on the recall of information. *MIS Quarterly*, March, 45-53.

Winn, B. (1987). Charts, graphs and diagrams in educational materials. In D.M. Willows and H.A. Houghton (ed). *The Psychology of Illustration: Volume 1 Basic Research*, 152-198, New York: Springer-Verlag.

INTERPRETATION OF QUANTITATIVE DATA: THE EFFECT OF GRAPHIC FORMAT, AGE AND GENDER

Helen B. Miller

The selection of the "right" graphic format to present quantitative data to various audiences continues to confront educators and instructional designers. Over sixty years ago, John Washburne (1927) investigated the effects of tabular, textual, and graphic arrangements on the recall of quantitative data. In his study, junior high school students were presented with one of 14 forms and were tested on their ability to recall specific amounts, as well as to make static and dynamic comparisons and rank orderings. Washburne, from this study, established some general rules for the appropriate use of various graphic, tabular, and textual forms. He stated that:

1. For static comparisons, use a bar graph.
2. For dynamic comparisons, use a line graph.
3. For specific amounts use a table.
4. Textual form is inappropriate for presenting more than two items of numerical data.

In 1989, Head and Moore used the Washburne study as a starting point for investigating the effect of graphic format on the interpretation of quantitative data. Their study developed some of Washburne's original textual information into a narrative, which was used as an oral introduction to the fictitious data presented. In their study with undergraduate college students, four graphic formats were compared: bar, line, table, and line-table. These four graphs were computer-generated slides, which enabled the researchers to present the information in a regulated format. That is, the graph designs were matched not only by quantitative data, but for color and shape. Their study used an improved research method from that of the Washburne study which tried to compare 14 different formats with few controls and limited use of statistical methodology. As in Washburne's study, three types of quantitative interpretation were tested, that of specific amounts, static and dynamic comparisons. From their study, the following conclusions were presented:

1. For specific amounts and static comparisons, use a table graph.
2. For specific amounts and static comparisons, the line and bar graph did not differ.

3. For dynamic comparisons, use table or line-table graphs.

Almost as an afterthought, Head and Moore (1989) added five questions which requested the students to recall information from the particular graph (bar, line, table, and line-table) they had been viewing when interpreting the data. Interestingly, they found that the participants viewing the line, line-table, and bar graphs (in that order) obtained much higher scores than those viewing the table graph. This finding is one of the most interesting aspects of their study. The study described here replicated the Head and Moore study, and expanded their research to include a more systematic investigation of these "imagery" effects as well as to extend the research to examine possible age and gender effects or interactions.

RESEARCH QUESTIONS

1. Which graphic format among table, line, bar, and line-table generally enables the learner to more accurately interpret quantitative data?
2. Which specific graphic format among table, line, bar, and line-table enables the learner to more accurately answer amount, static and dynamic questions?
3. Are there gender differences in the ability to utilize graphic formats to interpret numerical data?
4. What graphic format (table, line, line-table, bar) is the most effective when the learner is attempting to recall (imagery) numerical data?
5. Are there age differences in the ability to utilize graphic formats to interpret numerical data?
6. Are there any interactions among or between the variables of age, gender, graph formats, and types of questions?

METHODOLOGY

Participants

There were 129 fifth and sixth-grade students and 129 eleventh and twelfth grade students.

Procedures

There were four treatment groups. Each group viewed one of four treatment slides. The elementary and high-school students were randomly assigned, as a class unit, to one of four treatment groups. In these classes, students had been randomly assigned by the school system. An audio tape containing the orientation story narration, test directions, and test questions was used. After the story narration was heard, each treatment group viewed one graph containing fictitious data presented on a 35mm slide. The same fictitious data, describing the incomes of various European merchants, was shown to each of the four groups in both the age groups. The treatment slides (from Head & Moore, 1989) were in one of the following graphic formats: 1) bar, 2) line, 3) table, 4) line-table combination. The data was fictitious to alleviate any effect of prior knowledge, and described various European merchants' income during the middle ages. While viewing the graph, the students responded to the same 42 questions in three categories: specific amounts, static and dynamic comparisons of the data. The narration, data, and questions were developed by Washburne (1927) and revised by Head and Moore (1989). The order of the three types of questions were randomly placed and presented in the same order to all four treatment groups. The students were given 9 seconds to respond to each question.

Upon completion of the 42 questions, the students were asked to from a mental picture of the slide they had been viewing. They were given one additional minute to view the slide. The projector was then turned off and the students were asked to respond by giving numerical or verbal answers to 14 questions. Questions in this category were developed by expanding the original five questions developed by Head and Moore (1989). These questions paralleled the previous static and dynamic test questions. All students in all four treatments answered the same questions given in the same order. The students had 7 seconds to respond to each question.

Analyses of Data

A 4 (Graph Type) X 2 (Age) X 2 (Gender) multivariate analysis of variance (MANOVA) with repeated measures for the four types of questions was planned and performed. The independent variables were type of graph (between), age (between), gender (between), and type of question (within). The dependent variable was the interpretation of quantitative information as measured by the test questions.

The analyses of simple interaction effects were performed due to the presence of interaction effects. These analyses allowed for the "tearing apart" of interactions.

RESULTS

In the analysis of main effects (see Table 1 for means), graph (F(1,242)=5.54, MSe=11.49), and age (F(1,242)=75.80, MSe=11.49) were statistically significant ($p<.001$). These main effects are qualified, however, by four interaction effects, for graph by question types (F(9,726)=8.04, MSe=3.22, $p<.001$), age by question types (F(3,726)=9.21, MSe=3.22, $p<.001$), graph by age by question types (F(9,726)=4.64, MSe=3.22, $p<.001$), and graph by gender by question types (F(9,726)=1.86, MSe=3.22, $p<.055$). No further analysis of the main effects was conducted because of the nature of the interaction effects, which are the primary consideration of this study. Post-hoc analyses of the interactions were completed using the Simple Interactions Effects Analysis.

Interactions Effects Analysis.

The interaction, graph by question type, as seen in Figure 1. shows that high-school and elementary students scored higher on the amount (F(3,664)=11.53, MSe=5.29, $p<.01$) and static (F(3,664)=9.39, MSe=5.29, $p<.01$) questions when viewing the table graph (X=13.18, X=12.18), than the students viewing the three other graphs. Students scored higher on the dynamic, (F(3,664)=4.74, MSe=5.29, $p<.01$) and recall, (F(3,664)=4.08, MSe=5.29, $p<.01$) questions, when viewing the line-table (X=10.07, X=11.5) and line graphs (X=9.11, X=10.87) than the students viewing the table or bar graphs. These results, therefore, indicate a preference for graph type when interpreting amount, static, dynamic, and recall questions of numerical data.

Table 1

Mean Scores of Question Types by Sex, Age, and Graph Type.

		MALE			FEMALE			
Graph	Question	HS	ELEM	TOT	HS	ELEM	TOT	GRTOT
Table	Amount	13.00	12.60	12.80	13.67	13.44	13.55	13.18
	Static	12.37	12.37	12.37	13.10	10.89	11.99	12.18
	Dynamic	10.84	8.10	9.47	10.91	5.78	8.34	8.91
	Recall	11.95	9.70	10.82	11.29	9.67	10.48	10.65
	TOTAL	12.04	10.69	11.37	12.24	9.95	11.09	11.23
	NUMBER	19	10	29	21	9	30	59
Line-table	Amount	12.93	11.21	12.07	12.58	9.86	11.22	11.50
	Static	11.80	9.57	10.69	12.53	8.57	10.55	10.62
	Dynamic	11.13	9.93	10.53	10.21	9.00	9.61	10.07
	Recall	11.73	10.93	11.33	12.05	11.29	11.67	11.50
	TOTAL	11.90	10.41	11.16	11.84	9.68	10.76	10.92
	NUMBER	15	14	29	19	7	26	55
Line	Amount	11.52	9.75	10.64	11.77	10.39	11.08	10.86
	Static	11.04	8.58	9.81	11.36	9.17	10.27	10.04
	Dynamic	10.13	8.50	9.32	10.36	7.44	8.90	9.11
	Recall	12.25	10.25	11.25	11.32	9.67	10.49	10.87
	TOTAL	11.24	9.27	10.26	11.21	9.17	10.19	10.22
	NUMBER	23	12	34	22	18	40	75
Bar	Amount	11.64	10.93	11.29	12.80	10.00	11.40	11.34
	Static	11.64	10.00	10.82	12.07	9.22	10.64	10.73
	Dynamic	10.27	6.07	8.17	10.73	7.17	8.95	8.56
	Recall	10.27	9.86	10.07	10.53	9.72	10.13	10.10
	TOTAL	10.96	9.22	10.09	11.53	9.03	10.28	10.18
	NUMBER	22	14	36	15	18	33	69
	TOTNUMBER	79	50	129	77	52	129	258

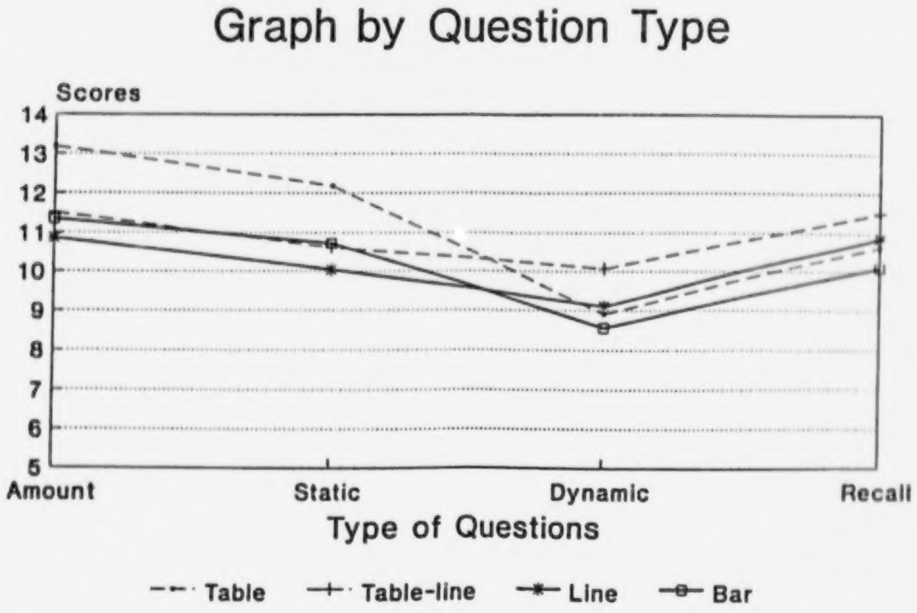


Figure 1. Total mean scores for high school and elementary students by graph type.

The interaction, age by question type, as seen in Figure 2, shows that although the high-school students outperformed the elementary students for each question type, Amount, (F(1,664)=27.91, MSe=5.29, p<.01); Static, (F(1,664)=60.88, MSe=5.29, p<.01); Dynamic, (F(1,664)=94.19, MSe=5.29, p<.01); Recall, (F(1,664)=20.29, MSe=5.29, p<.01), the effect of age was not consistent across all question types. The difference in scores on the amount (HS, X=12.48, Elem., X=11.02) recall (HS, X=11.42, Elem., X=10.13) questions are closer together for the two age groups, than the scores on the static (HS, X=11.99, Elem., X=9.8) and dynamic (HS, X=10.57, Elem., X=7.75) questions. These results indicate developmental differences in the ability to interpret amount, static, dynamic, and recall questions of numerical data.

The three-way interaction, graph by age by question type, as seen in Figures 3a (high-school students) and 3b (elementary students) shows that the mean scores for each question type are closer together for the high-school students than those for the elementary students. This interaction indicates that the graphic format best to interpret amount, static, dynamic, and recall questions for quantitative data is dependent on the age of the students.

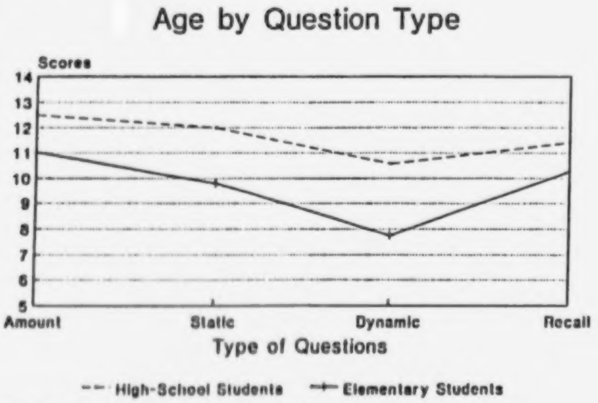


Figure 2. Total mean scores for high school and elementary students by age.

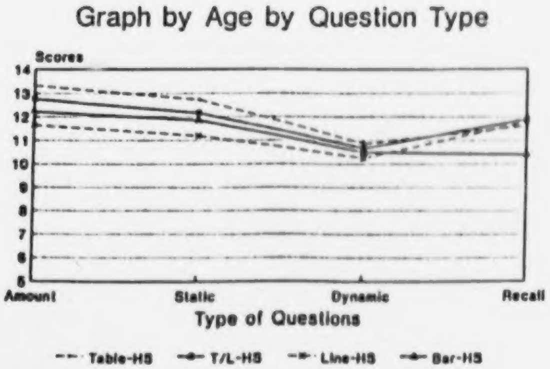


Figure 3a. Mean scores of high-school students on questions by graph type.

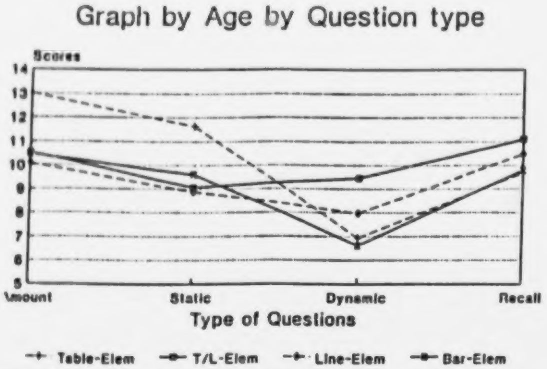


Figure 3b. Mean scores of elementary students on questions by graph type.

An analysis of simple interaction effects indicate that high-school students' ability to interpret quantitative data for three types of questions, amount, static, and recall depends on the type of graph viewed. On the amount questions (F(3,664)=4.32, MSe=5.29, p<.01), students interpreting the table graph had the highest scores (X=13.33), while the students interpreting the line graph had the lowest scores (X=11.65). On the static questions (F(3, 664)=3.39, MSe=5.29, p<.05), students viewing the table graph also scored the highest (X=12.73). On dynamic questions (F(3,664)=1.67, MSe=5.29, p>.05), the students did equally well using any of the four graphs. The bar graph (X=10.4) was the least effective for answering the recall questions (F(3,664)=3.10, MSe=5.29, p<.05).

Simple interaction effects indicate that elementary students' ability to interpret quantitative data for three types of questions, amount, static, and dynamic depends on the type of graph viewed. On the amount (F(3,664)=6.91, MSe=5.29, p<.01), and the static (F(3,664)=5.42,.MSe=5.29, p<.01) questions, the students viewing the table graph had the highest scores (X=13.02, X=12.73, respectively). This is the same for the high-school students. Elementary students using the line-table graph (X=9.46) and the line graph (X=7.97) to answer dynamic questions (F(3,664)=7.52, MSe=5.29, p<.01) achieved the highest scores (X=9.46). For the high-school students, no graph emerged as statistically superior for the dynamic questions. On recall questions (F(3,664)=1.67, MSe=5.29, p>05), the elementary students did equally well using any of the four graphs.

The three-way interaction, graph by gender by question type, as seen in Figure 4a (males) and Figure 4b (females) show that there are gender differences in ability to use graphic formats to interpret numerical data.

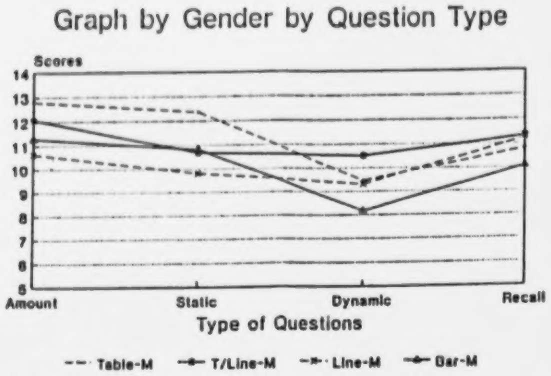


Figure 4a. Mean scores of male students on questions by graph type.

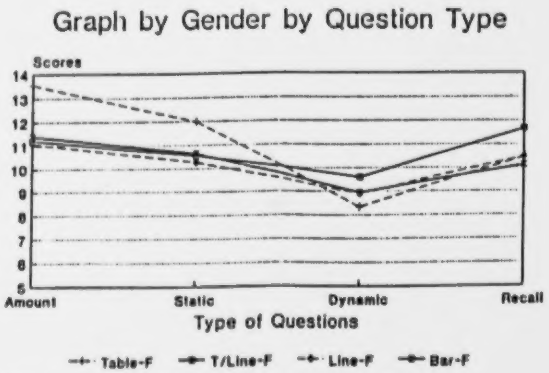


Figure 4b. Mean scores of female students on questions by graph type.

For the male students, the ability to interpret quantitative data for three types of questions, amount, static, and dynamic, is dependent on type of graph. These participants, when viewing the table graph, had the highest scores (X=12.8, X=12.37) on the amount (F(3,664)=4.37, MSe=5.29, p<.01) and static (F(3,664)=4.51, MSe=5.29, p<.01) questions. For the dynamic questions (F(3,664)=2.95, MSe=5.29, p<.01) the interpretation of the line-table graph produced the highest scores (X=10.53). Students did equally well on the recall questions (F(3,664)=2.31, MSe=5.29, p>.05) no matter what graph they viewed.

For the female students, the ability to interpret quantitative data for three types of questions, amount, static, and recall is dependent on type of graph. Similar to the males, the females, when viewing the table graph, had the highest scores (X=13.55, X=11.99) on the amount (F(3.664)=7.70, MSe=5.29, p<.01) and static (F(3,664)=5.61, MSe=5.29, p<.01) questions. On the recall questions, these students achieved the highest scores (X=11.67) when viewing the line-table, which differs from the males where no graph emerged as superior. Female students did equally well on the dynamic questions no matter what graph they were viewing (F(3,664=1.22, MSe=5.29, p>.05). This finding is in contrast to the males viewing the line-table graph who produced the highest scores (p <.01).

CONCLUSIONS

The study was designed to investigate the interpretation of numerical data when presented in several different graphic formats to different age groups and sexes. The findings indicate that graphic format, age, and gender do affect the ability to interpret numerical data. These findings support the results of Head and Moore (1989), that certain graphs are more effective presentations of data in terms of students' ability to answer certain types of questions.

Interaction of Age and Types of Questions

The interaction between age and question types indicated that high school students scored higher than elementary students on all four questions. This is a predictable result based on both the information-processing model and Piagetian theory, which support the concept that ability to use memory efficiently increases with age. The difference in mean scores between the two age groups is larger for the two more difficult questions: static and dynamic. The static questions required the students to do comparisons in a given year, and the dynamic questions required the students to scan across the years. In comparison, the amount questions required only a reading of one dimension on any of the graphs. These findings are supported by Gross (1985) and Finkle (1973) who found that young children have difficulty concentrating on more than one dimension at a time. The closer mean scores between the two age groups in the recall questions is more difficult to explain, because the majority of these questions require the students to make comparisons across the entire time span of the experiment. Thus, this type of question would demand a more sophisticated strategy in order to answer correctly, yet the means for the two groups are closer together than the means for the static and dynamic questions. One explanation would be that both groups were aided in answering these questions by the one-minute time period given to examine the graph before the recall questions began. In this case, both age groups could familiarize themselves with the graph in preparation for answering additional questions (e.g., Anderson, 1985).

Interaction of Graph and Type of Questions

The interaction between graph formats and types of questions indicate that certain graphs are better for answering certain types of questions. The table graph was better for answering amount and static questions, while the line-table graph was better for answering dynamic and recall questions. The students viewing the line graph received the lowest scores on the amount and static questions, but then recovered for the dynamic and recall questions, scoring the next highest scores to the line-table graph. The line graph results for dynamic and recall questions is supported by Heinich, Molenda, and Russell (1985) and Griffin (1988). They proposed that line graphs be used when data covers a long period of time with the emphasis on trends, estimates, and interpolations of the data. The efficiency of the table graph for the amount and static questions is consistent with the findings of Head and Moore (1989). The students viewing the bar graph had lower scores for all types of questions, but did score the second highest on the static questions. This finding is confirmed by Griffin's (1988) recommendation that bar graphs be used to compare or contrast a specific amount between one period and the next. Yet, it is in contradiction to his point that bar graphs can emphasize the amount of data in a series, since students received lower scores on the amount questions when viewing this graph. A point could be made that the efficiency of the line-table graph for the dynamic and recall questions may be due to its line dimension, since the students viewing the table graph scored lower on the dynamic and recall questions, while the line treatment students scored the second highest on these two types of questions.

Interaction of Graph, Age and Types of Questions

The three-way interaction between graph, age, and types of questions indicate that selection of graph format is relevant to the age of the participant and the type of question. High-school students' scores on the amount, static, and recall questions depend on the viewing of a particular graph. The table graph was the most efficient graph for these older students to use to answer amount and static questions. Macdonald-Ross (1977) suggests a table graph has a compact format, thereby, enabling easy access to data for answering questions on a single dimension. Head and Moore (1989) suggest the success of the table graph is due to the limited number of data points, and therefore, the table provides easy readability for amount and static questions. Students did equally well on dynamic questions no matter which graph they were viewing. This result is similar to Head and Moore's results, in that no graph emerges as more effective, and that the students viewing the line and bar score the lowest on the questions. The literature (e.g., Griffin, 1988; Macdonald-Ross, 1977) suggests the use of line and bar graphs to compare data across more than one dimension, yet this study, like Head and Moore's did not support this premise. On the recall question, the bar graph was the least effective. Head and Moore suggest that the failure of the line and bar graph to be superior on the dynamic and the recall questions may be due to the small amount of data, therefore enabling the other graphs to be used just as, or even more, efficiently than these two types of graphs.

Elementary-school students' scores on the amount, static, and dynamic questions depend on the viewing of a particular graph. The table graph was the most efficient graph for these students to use to answer amount and static questions, which is the same as the older students. On recall questions, these students did equally well using any of the four graphs. Again these results are similar to the high-school students who used all but the bar graph equally well to answer these questions. On the dynamic question, the elementary students in the treatment groups of either the line-table or the line graphs conditions scored higher. Younger children, who are not able to process information as quickly and as efficiently as older children (Sheingold, 1973), may have found these graphs easier to process due to their spatial nature which illustrates variations on at least two dimensions (Griffin, 1985; Macdonald-Ross, 1977).

The simplicity of easily reading the data from the table and determining relationships among the year categories seemed to help the younger students in answering the amount and static questions. The more complex nature of the other graphs would have required more processing skill, which the high-school students could have handled more easily. Lange (1973) and Vaughan (1968) suggested that organizational techniques seem to demonstrate developmental trends. This explanation would also be supported by Larkin and Simon (1987), who proposed that if two representations are informationally equivalent, their computational efficiency depends on the information-processing operators in use. Their ability to focus their attention would increase high-school students' computational efficiency over that of the elementary school students.

Interaction of Graph, Gender, and Type of Question

The three-way interaction of graph, gender, and type of question indicates that two types of questions, dynamic and recall, have different efficacy for the two sexes. The range of difficulty of the four questions was the same for both groups. This range of difficulty from highest to lowest was dynamic, static, recall, and amount. For dynamic questions, males' scores depended on the type of graph they used, while females did not. Both groups scored higher using the line-table graph, but the males' scores were significantly higher, while the females were not. The dynamic question required scanning across the years which could favor a spatial orientation, as found in the line-table graph and which the research has also indicated is usually a more developed skill among males (Maccoby & Jacklin, 1974; Thomas & Jamison, 1975).

Summary

In analyzing the selection of the "right" graphic format to present quantitative data, several indications can be derived from this study. First, the table graphs are effective means for answering amount and static questions. As the questions become more complex, as in a dynamic question, then the table graph is one of the least effective means of graphic communication. Second, in recall, the indication is that the line-table format and then the line format may be the most effective graph to use. Third, an age difference emerged, as did a gender difference for particular graphs.

To suggest implications for utilizing the "right" graphic format, the presenter's goal for displaying the quantitative data has to be analyzed. If the presenter wants the audience to leave the presentation remembering a visual image and understanding the data, then the line-table seems to be the most effective over all groups, ages and sexes. If the presenter's purpose is for the audience to quickly analyze data and locate certain points, then the table graph is the most effective. An important point made by Head and Moore (1989) is that the data set is relatively small with only 24 data points. A larger set may give less advantage to the table graph and more advantage to a more spatially-oriented graph such as the line or bar graph. This would be supported by Larkin and Simon's (1985) work, which indicates diagrams are a more efficient means to communicate complicated information.

High-school students can interpret and encode quantitative data in graphic format with relative ease as demonstrated by their high means in this study. Younger students have a more difficult time. Further research into effective graphic communication for younger students is needed.

Male performances on the visual interpretation task was not superior to the female performances. This was not a predictable result since much of the literature indicates a stronger spatial visualization skill for the male.

References

Anderson, J. R. (1985). Cognitive psychology and its implications. New York: Freeman.

Finkle, D. L. (1973). A developmental comparison of the processing of two types of visual information. Journal of Experimental Child Psychology, 16, 250-266.

Griffin, R. E. (1989). Using graphs correctly: What are the basic elements in the language of graphs. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.). About Visuals: Research, Teaching and Applications. Blacksburg, VA: IVLA.

Gross, T. F. (1985). Cognitive development. Monterey, Calif.: Brooks/Cole Publishing Company.

Head, J. T., & Moore, D. M. (1989, February). The effect of graphic format on the interpretation of quantitative data. Paper presented at the annual meeting of the Association for Educational Communication and Technology Annual Conference, Dallas, Texas.

Heinich, R., Molenda, M., & Russell, J. D. (1985). Instructional media and the new technologies of instruction. New York: John Wiley & Sons.

Lange, G. (1973). The development of conceptual and rote recall skills among school-age children. Journal of Experimental Child Psychology, 15, 394-407.

Larkin, J. H. & Simon, H. A. (1987). Why a diagram is (sometimes) worth ten thousand words. Cognitive Science, 11, 65-99.

Maccoby, E. E., & Jacklin, C. N. (1974). The psychology of sex differences. Stanford, Calif.: Stanford University Press.

Macdonald-Ross, M. (1977). How numbers are shown: A review of research on the presentation of quantitative data in texts. AV Communication Review, 25, 359-410.

Sheingold, K. (1973). Developmental differences in intake and storage of visual information. Journal of Experimental Child Psychology, 16, 1-11.

Thomas, H., & Jamison, W. (1975). On the acquisition of understanding that still water is horizontal. Merrill-Palmer Quarterly, 21, 31-44.

Vaughan, M. E. (1968). Clustering, age, and incidental learning. Journal of Experimental Child Psychology, 6, 323-325.

Washburne, J. N. (1927a). An experimental study of various graphic, tabular, and textual methods of presenting quantitative material. Part 1: Journal of Educational Psychology, 18, 361-376.

Washburne, J. N. (1927b). An experimental study of various graphic, tabular, and textual methods of presenting quantitative material. Part 11: Numerals and written numerals. Journal of Educational Psychology, 68, 71-75.

SQUARE ONE TELEVISION AND GENDER

Ann DeVaney
Alejandra Elenes

Square One TV is an informal instructional mathematics program broadcast daily by PBS for eight to twelve year olds. Developed two years ago by the Children's Television Workshop (CTW), it aims to change viewers attitudes toward problem solving and to show the usefulness of math in daily life. Although the program was created to help U.S. students "catch up" to their counterparts in other countries, CTW designers decided, at some point in time, not to teach children math, but to change their attitudes. It is clear, then, that the program is affective in nature and only secondarily cognitive.

Bias

Square One TV is broadcast daily for 30 minutes after school and after the screening of *Sesame Street*. Its format is hybridized. It borrows the structure and conventions of 1980s commercial television programs such as *MTV*, *Saturday Night Live*, game shows (particularly *Wheel of Fortune*), police dramas and children's cartoons (particularly male super hero shows). Additionally, it parodies *Sesame Street*, 1970s comedies, such as *Laugh In*, and classic detective films of the 1940s (particularly those with Humphrey Bogart).

In a typical *Square One TV* program (#162), 8 to 12-year-old viewers were presented with the following audio or visual sequences at the times indicated.

-45 sec.	The Spanish language is parodied with "Tierra del Freezo" in the visual track.
-47 sec.- 7 min. 18 sec.	The Norwegian language and cultural habits are parodied in a sequence about "Vikings."
-8 min. 33 sec.- 11 min. 7 sec.	The audio track of an MTV-like song delivered by a young man includes, that chick, Maria like an apple she is rotten to the core. The visual track of this song includes nurses in short revealing white uniforms ministering to the young man by dancing around him.

Approximately one third of a program whose objective is to change student attitudes toward mathematics is either blatantly sexist or racist. Further analysis of *Square One TV* has indicated that the percentage of bias in all programs sampled varies from 20% to 40%.

Project

This paper will describe one stage of a post structural analysis of *Square One TV* focusing on gender issues in the visual text. At first glance, it is difficult to understand how CTW, with twenty years of sensitive children's programming to its credit, could produce such a biased program. *Square One TV* design documents certainly contain no intent to be sexist or racist. Early designers, in fact, are surprised that the program bias exists. Yet, a decision to borrow the structure of 1980s commercial television programs is not a neutral one. Since television programs, like other cultural forms, encode meaning in their structure, they carry with them paradigmatic meaning which has grown up around the use of a particular format. Post structural textual analysis has the power to uncover the path by which sexism and racism were unwittingly enfolded in *Square One TV*.

The post structural reader theory which we are employing to analyze *Square One TV* is reception theory, a German social reader theory practiced by Jauss (1982), Ingarden (1973), Iser (1978) and other textual analysts. (We will also apply this to *Sesame Street*.) It has the uncanny ability to account for transformations and history, an ability that is glaringly lacking in deconstruction. This theory allows us to consider the relationships among viewers, designers and the TV text of *Square One TV*. The TV text itself is analyzed for codes or syntax patterns emerging from the use of such structural elements as frame, lighting, camera angle, shots, shot transitions and scenes. Codes are traced to their domain of origin, since tv codes are seldom original, and examined for paradigmatic meaning. Unlike other post structuralists, Jauss (1982) does not jettison semiotics when investigating the relationship between reader and text. He believes that the text continues to expand the "horizon of expectations" of readers and, conversely, that their readings continually act on the text to change the parameters of its meaning.

Square One TV viewers will first be interviewed and using the results of those interviews, we will survey a larger audience. Since current educational tests to measure affect are based on psychological theories of motivation and/or learning, they ignore the social formation of knowledge and, consequently, the presence of communal readings. (Since CTW producers have declared this program an affective one, it precludes math educators from testing for cognitive gains and excuses CTW from educational accountability.) Affect should be assessed in some way. Jauss (1982) provides us with a description of modalities of identification, such as associative, admiring, sympathetic, etc. and receptive dispositions, such as transfer, admiration, pity, etc. Our interviews and surveys will be based on Jauss' concepts of reception. Additionally, *Square One TV* design documents will be examined and, if cooperative, designers interviewed. Relations between and among these three sources will be explored. Again, this essay will describe one stage of the larger study. It will investigate the program itself, *Square One TV* (*SOTV*, for issues relating to gender. Subsequent reports will be written about the relationship between and among the text, the viewers and the sources of production. It is not surprising that commercial television culture leeched into a supposedly benign program designed for 8 to 12-year olds. It is sad that it has and quite difficult to explain. We believe the analytical tool presented here can trace the process of that cultural path.

PROGRAM DESCRIPTION

The three hallmarks of post modern texts are fractured narratives, fragmented reader subjectivities and dependence, in some way, on high technology (Nochols, 1988). After initial viewing, one might call *Square One TV* the quintessential post modern children's program, since it employs the latest TV technology to create fractured narratives and messages which, in turn, fragment the subject positions of the viewers. To capture the attention of children watching television after school, information about mathematics is incorporated in 1970s and 80s broadcast television formats and presented in segments of approximately 45 seconds to three minutes.

Reading or Viewing

Since television is a communication medium, it is subject to rules governing the sending and receiving of messages. Like any communication medium, it has its own language and grammar. That grammar is, however, renegotiated in daily practice, just as meaning is slowly renegotiated in the use of any language. As the signs and symbols of television are patterned in daily use, codes accrue. Meaning is created when viewers interact with or read television codes which are familiar to them. Codes are usually format specific, such as those specific patterns and conventions which grow up around the production of talk shows, news broadcasts, or sports programs. Viewers becomes familiar with format codes and with the way messages are created within a format. They, consequently, have expectations for understanding, talk shows, news broadcasts or sports programs. A viewer's "horizon of expectations (Jauss 1982) is pushed by an innovator within one format, such as David Letterman or Roseanne Barr. These performers break the codes or conventions of the current format and begin to redefine it.

Fractured Messages

One post modern technique, particularly visible in architecture, novels and popular media, such as television, is the mixing of forms. Two innovative areas of broadcast television which specialize in mixing formats are commercials and MTV. Within one segment of either of these, the viewer may be offered dramatic narrative, demonstration, comedy skits, animation, documentary or other formats. When forms are mixed numerous things happen to both the message which is being constructed and the viewer who is interpreting that message. If a plot is variously presented in dramatic narrative, documentary and instructional forms, the story is totally fragmented. Such fragmentation of narrative has been used to best effect by some post modern novelists such as Italo Calvino and Peter Handke, but the world of television appears to invite this fragmentation. *Square One TV* has approximately 20 formats which it incorporates and it may include 14 to 16 of them within a 30 minute program. Most of the formats are broadcast television formats or filtered through broadcast television formats. Some of them are summarized in Figure 1 (see Figure 1).

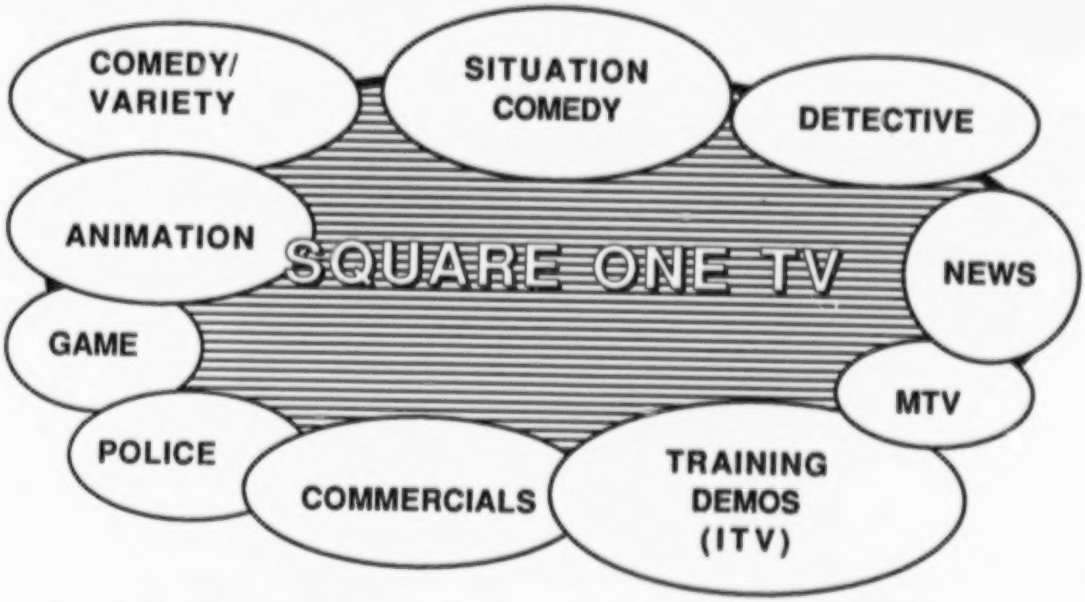


FIGURE 1: Overlapping codes of SOTV and Broadcast Television Formats

Program segments run approximately 45 sec to 3 min. and indeed offer fractured messages. The structure of SO TV, furthermore, consists of and only of broadcast television forms. It is as if the designers conceived of television as the whole culture of the child. They use television as one large cultural text which can only reflect itself. It is true that media and communication technologies are so vast and powerful, that our culture is primarily a culture of images or representations. But the producers of *SOTV* took this notion too far when they decided to awaken students' interest in math by reference only to the world of television. These formats incorporate meaning in their structure and whether they are employed in their original programs or adopted as part of SO TV, they use the same codes and conventions, the same visual grammar.

Reading Positions

As viewers try to make sense of messages being transmitted by any television program, they rely upon familiar visual codes to interpret or create meaning from what they see. Reader theorists would say that these viewers are the subjects of their own interpretations or meaning (Tompkins, 1980). They do, however, rely upon the social and cultural meanings of visual codes being employed in these programs. If they care to interpret messages as they are constructed, they are reading "with the program" or accepting the dominant message. If they read against the program or "against the grain," they may reinterpret messages in light of codes which have been established in some subculture such as gays and lesbians (Ellsworth, 1988) or high school students (De Vaney, 1987). Gays reappropriate dominant messages in some elaborate Hollywood musicals, for their own means. High school students read the films of John Hughes differently than adults, because they are privy to and help establish the codes of teenage communication in their everyday lives. But what about young TV viewers watching *SOTV* after school? They are indeed sophisticated television viewers and can switch from format to format with a speed and facility that would astonish most of us, (note the initial popularity of MTV), but while they are adjusting to formats and switching codes, they are probably not reading "against the grain." They are simply making sense of the dominant message as it is presented. This is, most likely, part of the aim of *SOTV* producers, namely, to give audiences short doses of mathematics and hold their attention by switching formats. Viewers are, in other words, offered an invitation (Ellsworth 1988) to accept or buy the dominant message offered in each format.

If viewers are the subjects of their interpretations, they occupy what is called subject positions in relation to each interpretation. Since codes are format specific and messages are constructed by codes, the presentation of many formats in *SOTV* fractures the subjectivity of the viewers. It offers them a vast and, perhaps, confusing range of subject positions. Just what types of invitations are offered to viewers of these vacating formats? What are the subject positions these children are being asked to occupy? This analysis hopes to answer some of these questions.

Method

As indicated above, the textual analysis of *SOTV* is part of a larger project designed to investigate the way viewers make sense of and, consequently, learn from *Sesame Street* and SO TV. The method employed in this larger project is borrowed from a specific reader theory, reception theory, which considers relationships between producers, visual text and viewers] readers. This essay will report part of the analysis (gender issues) of the visual text. (Further essays, AECT 1990 and AERA 1990) will complete the analysis of all three areas. The method used for textual analysis here was as follows.

-Consecutive programs were sampled during two summer weeks.

-After initial viewing, the team formulated focus questions about messages surrounding gender.

-Segments in which these messages appeared were I located and since messages are format specific, formats were identified.

-Segments were reviewed for visual codes within format.

-syntax patterns within shots were identified
-syntax patterns between shots were identified
-syntax patterns in scenes or sequences were identified

-Codes of similar formats on broadcast TV were briefly described.

-Relationships between codes on broadcast TV and *SOTV* were drawn.

GENDER BIAS

SOTV programs incorporated sexism or racism in 20-40 percent of each program, therefore, many segments were available for analysis. We selected segments in which the bias was blatant and some in which it was subtle. The two segments described below were two in which sexism was blatant.

Jonathan Apple Rap; Rotten to the Core

Summary. In a psychiatrists' office a young man presents himself to the doctor and explains his "problem." At his workplace, a young girl, Maria, peels apples faster than he can. That fact upsets him, but, secondarily, he cares to learn how to compute Maria's rate of work and his to find the rate per hour at which they could jointly work. In MTV style, the young man sings his problem. The doctor and his crew of short skirted nurses who dance around the young man, solve the problem for him.

Format. The format of this segment (2min 40sec.), or more correctly, music video is ostensibly an MTV format. Opening titles consist of a rotating *Square One TV* logo that is similar in structure to an MTV' logo. The syntax patterns are MTV codes during opening and closing sequences. Jump cuts articulate the opening series of tight shots of dancing feet. As in MTV, the geography of the plane is not established during the opening, and the feet, as well as viewer positions, are tossed around in the visual plane. During the first 40 seconds, the camera work is slightly complex with multi-angled tight shots of Jonathan and the doctor juxtaposed with matching cuts. One point of view POV) shot is included. During this same time period, another locale is established for flashbacks. The scene, to be repeated many times throughout the music video, is a medium long shot of Jonathan's workplace and is encircled by a halo of soft white light (iris-in slightly) to distinguish it as a flashback. A clock rotates across this medium long shot and this is the final visual MTV code that viewers will see until the end of the segment.

The major portion (2 min.) of the music video alternates between scenes in the doctor's office and flashbacks. In both locales the actors are presented as if contained on a stage, most often facing and speaking to the viewer, rather than to one another. Syntax patterns include medium or medium close shots, which are three person shots or four person shots with actors facing the viewers. These are medium angled shots "on the level." The static nature of these codes is quite surprising in an MTV format, particularly since some of the actors regularly dance and sing. The only MTV code that appears to be retained is the duration of the shots; they are short and fast. One might ask if the MTV format was adopted to catch attention and dropped because more serious "subject matter" needed to be communicated. Shots in a medium to medium close range, actors addressing the audience, and shooting "on the level" for the sake of credibility are certainly not codes drawn from MTV, but from instructional film or television, particularly from demonstrations. (We believe these codes were established in World War II training films.) The flashback scenes contain specific clues to this instructional format. Even though flashbacks are a dramatic narrative technique, these are particularly static with no subjective and little objective motion and students are prepared for demonstration. Indeed, all of the superimposition of numbers and math calculations in this music video occur in these flashbacks. Perhaps the designers designated these scenes as the serious instructional ones, therefore, the camera and actors remain static. This switch to instructional formatting within segments is very characteristic of *SOTV* and can be seen in almost every segment.

Content. When Jonathan presents his math problem to the psychiatrist, the doctor construes it as a Freudian problem and tells the young man that his working partner, Maria, has "done a number on his self esteem," because she can peel apples at a rate faster than Jonathan's rate. The doctor informs him that he is

...consumed with apple envy
...you feel she's all a feeling
...but she's rotten to the core

Maria's peeling skills, he tells Jonathan, will get him fired. The doctor then describes a dream Jonathan will have in which he will crush Maria and his boss into applesauce. During this advice there are very tight shots of Jonathan's panicked face. Two nurses, dressed in old fashioned white uniforms which are, incidentally, short and tight, provide a refrain for the doctor's advice. They sing that "problems are tearing him [Jonathan] apart and note that he has a "busted ego" and a "broken id." (Remember all of these actors are addressing the viewer.) Whether these nurses are singing or not, they usually frame the doctor or Jonathan, standing on either side of the man. Suffice it to say, that they also make many gratuitous moves while dancing.

Numerical graphics are both superimposed and edited into the flashback scenes. Graphics shots are approximately 30 seconds in duration and they demonstrate to the viewer the manner in which to calculate the combined rates/hour at which two workers produce.

As the segment ends, Jonathan, in a 30 sec. sequence, ignores the Freudian interpretation of his problem and indicates that it is only a math problem. The music video closes, as does similarly on MTV, with a banner in the upper lefthand corner which contains the singer and song title and a similar banner in the upper righthand corner with the word "Exclusive" on it. The banner in the upper lefthand corner reads, Jonathan Apple Rap, Rotten to the Core.

Commentary. The purpose of this commentary is to question the visual text itself and hypothesize about the formation of viewer interpretations. (*SOTV* viewers and designers will be polled as this research continues.) Visual structural codes of MTV were employed in opening and closing titles and opening sequences. MTV verbal codes of rap, song and dance were employed throughout. Since codes are format specific, student viewers were prepared to be entertained and were probably delighted by the fractured geography of the plane and the rap. Only 40 seconds into this segment, the format changes to an instructional one, although rap is retained throughout. Children are sophisticated television viewers, a fact which CTW designers appreciated, and the viewers tacitly understand this shift. Video demonstration is something with which they are quite familiar and the mixing of instruction and rap probably delighted them and helped maintain their attention. They do not have trouble reading mixed formats.

But what was actually taught during the instructional sequences of this music video? If the intention of the designers is to interest students in math, then the arithmetic part of the segment was important. Yet these shots were only approximately 30 seconds long, hardly long enough for the adults whom I consulted to calculate the problem. Whether intentional or not, what was transmitted during the instructional sequences of this music video were social and cultural messages. The rap constructs a familiar discourse about women. "That chick, Maria," it tells the children is, "rotten to the core." Maria's offense is that she peels apples faster than Jonathan. In fact, the title of the music video the student is informed in a closing shot is Rotten to the Core. In an instructional format a closing shot helps to summarize and reinforce the message of the lesson. Jonathan, additionally, is told that Maria has "done a number" on his self esteem and that he is filled with apple envy. Not only does the music video reinforce sexist notions of women with which these viewers are familiar, but introduces them to new sexist Freudian concepts. To reinforce this discourse, nurses are shown framing a man and are presented in a toned down version of MTV female background singers.

The construction of the whole music video is intricate, because the designers, in this age of raised consciences, paid tribute to racial equality by casting black actors as the doctor and one nurse. Additionally, they displayed their own knowledge of gender issues by allowing Jonathan to ignore, but not reject, the Freudian interpretation of his problem. Since the designers now know better, they may feel that knowledge allows them to joke about sexism. But then, in the form of Jonathan, they indicate that they were only joking. This ironic distancing of author or producer from their subject matter, with an expectation that enlightened viewers will also distance themselves, is a practice emerging in post modern literature and pop culture. Educators, however, must seriously question why students viewing a 2min. 40sec. supposedly mathematical music video were reintroduced to old concepts and taught new concepts about sexism?

The Coquette and the Quarter

Summary. In a dramatic skit which mixes the forms of dramatic narrative and advertisements, a young boy of 12 or 13 drops a quarter down a sidewalk grate. A young woman of the same age walks by and he bemoans the fact that he cannot figure out how much he dropped down the grate. He can neither see nor retrieve the coin. She tells him to subtract the amount he now has in his pocket from the amount he had prior to dropping the coin. He figures he has lost a quarter and she lends him one, so he may rent a film. They walk off together.

Format. This dramatic skit is 1 min. 30 sec. in length an mixes codes from dramatic narrative and advertisements uniformly throughout. The segment consists of one scene which is articulated primarily by jump cuts. Shots move through a range of very tight to tight, with the exception of the last medium shot in which the pair walk off together. The scene opens with a tight shot of the boy's shoes, jumps to a tight shot of his panicked face and then to a tight shot of pink pumps beneath a disembodied pair of tight jean legs. As the scene progresses, the viewer is forced to put these body parts together, feet, faces, eyes, lips, the girl's bottom and by doing so, they employ the reading codes of MTV. About 45 sec. into the scene, dramatic narrative dialogue codes are used to present the conversation between the actors. Even though the dialogue shots are POV, over the shoulder shots, the camera maintains its tight or very tight distance. The dialogue codes are not neutral here, but are layered with Hollywood film romance codes. The dialogue is presented as one between lovers. The camera lingers on the girl's adoring eyes or the boy's moonstruck eyes, presents them very close together and frames one scene to appear as if the two were kissing.

Content. The content of this sequence is quite simple. A boy drops a quarter down a grate and is upset by the fact that he cannot retrieve it, nor does he know how much he has lost. A young friend comes along and solves his problem by teaching him how to subtract and lending him a quarter, so he can rent the film he had planned to rent. It appears straight forward, but it is doubtful that subtraction is what is learned by children viewers. The audio and visual tracks are hardly related. An entirely different story is being told in the visual track.

Commentary. It is unimaginable that CTW designers could combine MTV codes with romantic Hollywood film codes and not know what they were doing.

Children viewers receive very tight shots of body parts, the girl's pink pumps with tight jeans, her mascarad eyes, her lipstick-red lips and her bottom. The boy is on screen less than she and fares only slightly better. His feet, face and "moony" eyes are shot. Again, the tight shots articulated with jump cuts probably delight the viewers and engage them, as they do in MTV, in establishing themselves in the geography of the plane and piecing together the message. The message involves the sexualization of children. Codes of kiddie porn are also evident in this segment. Children are heavily made up; certain body parts are fragmented and presented as sexual fetishes. What imbues the codes of advertisement and kiddie porn with power, however, is the employment of dramatic narrative codes. This is a story with a plot; boy meets girl; they "fall for" one another and walk off together. It is important to remember that viewers read dramatic narrative most often by identifying with the hero or heroine. Hollywood directors knew that when they established the dialogue codes of POV, over the shoulder shots. A point of view shot places the viewer in the shoes of the speaker. Very surprisingly, this is one *SOTV* segment in which no instructional format appears. Neither character ever addresses the audience, but even when dramatic narrative is invoked in other *SOTV* sequences, the instructional format consistently breaks in. It is difficult to imagine that the designers thought they were teaching subtraction in this segment, or even interesting viewers in subtraction. What is taught is how a 12 or 13 year-old-boy and girl should act, dress and speak in a sexual fashion. Again, the scene involves young viewers in a familiar discourse about gender relations. A young girl should dress and make up in a certain manner. Pumps should be worn with tight jeans. Mascara and lipstick are required and a bow in the hair is helpful. Her stance and looks, when talking to a boy, should be seductive. The poor boy, of course, is powerless in this situation. Certainly United States viewers from eight to 12 are familiar with this discourse, but the clothes and "the look" give them an updated version of the discourse, and the inclusion of children their own age, offers them role models. We must question who made the decision to include 12 or 13-year-old actors and 8 to 12-year-old viewers in this scene with codes from TV ads, Hollywood romance films and kiddie porn.

Patterns

This essay has only been able to address a fraction of the sexism inherent in *SOTV*. The larger study also examines racism and explores designer intentions and viewer interpretations.

Although this essay has only presented an overview of *SOTV* and an indepth analyses of two segments, we believe both the overview and the analyses are representative of the program as a whole. We have found bias in 20% - 40% of all programs sampled. To date, we have found a pattern in these biased segments, the characteristics of which have been mentioned in the analysis here. When sexist or racist materials are presented in these programs, designers most often distance themselves from, or excuse the material in various ways. Racist material is always hidden beneath the obvious inclusion of blacks in these segments. One must infer that the designers are partially color blind. Blacks are never parodied, but other people with accents are, such as Hispanics, Arabs and Italians. Sexist segments, however, are presented in one of two ways. The inclusion of blacks is sometimes used as a foil for sexism, as in Jonathan Apple Rap, but sometimes sexism is blatantly presented with no excuses. These two approaches are clearly present on current day broadcast television as well. Some detective shows, police programs and MTV are blatantly sexist. Yet, some sit-coms and ads use ironic distancing to present sexist materials. (Recall the current shampoo ad in which a sultry female voice tells the viewer that "All chicks like to be soft," while the camera focuses on actual yellow chicks. Later the camera does switch to the beautiful speaker.)

Late 80s performers are allowing themselves to be sexist or racist, perhaps because they know better and expect that their audience knows better. They allow themselves to be shocking. Even Johnny Carson,(Pareles, 1989) while recently playing one of his characters,"Clem," made such racist remarks that the studio audience gasped. He had distanced himself from his material by letting the bumpkin Clem deliver the lines. It is as if enlightened performers and audiences can now laugh at bigotry, because they are no longer bigoted. Other sociological reasons have been suggested for this return to bigotry, (Pareles, 1989) but ironic distancing is a major characteristic of the post modern age and television is the expert producer of the post modern visual text. We believe that the designers of *SOTV* recognized this. They also recognized that they were dealing with children whose primary cultural medium is television.

Children may be living in a post modern age and may be sophisticated viewers of television. But, their sophistication resides in their ability to shift format codes and decode visual information quickly. They are hardly ironic distancers and the pace of *SOTV* almost guarantees that they only have time to process the dominant message. They engage the facts of what they see. And even if they were ironic distancers, such distancing from patently sexist and racist discoursers works as an ethical sleight of hand for the practice of sexism and racism.

REFERENCES

De Vaney, A (1987). The world of John Hughes, *Framework* 1 , 1, 16-26.

Ellsworth, E. (1988). Media interpretation as a social and political act. *Journal of Visual Literacy 8* , 27-38.

Ingarden, R. (1973). *The cognition of the literary work of art*. tr. R. A. Crowley and K. R. Olsen, Evanston, Illinois; Northwestern University Press.

Iser, W. (1978). *The act of reading*. Baltimore; The Johns Hopkins University Press.

Jauss, H.R. (1982). *Towards an aesthetic of reception*. tr. T. Bahti, Minneapolis; University of Minnesota Press.

Nichols, B.(Winter 1988). The work of culture in the age of cybernetic systems, *Screen*, 29, 1,22-46.

Pareles, J (Sept. 10, 1989). There's a new sound in pop music: Bigotry, *The New York Times, Arts and Leisure*, pp. 1, 32-33.

Tompkins, J.P. (1980). The reader in history, *Reader response criticism*, ed. by J.P. Tompkins, Baltimore; The Johns Hopkins Press, 201-232.

Acknowledgement. The authors of this essay wish to acknowledge the invaluable assistance of Tonja Meyers, assistant editor of the *Journal of Visual Literacy*, in transcribing data from the television programs and preparing this paper.

RESEARCHING THE HISTORICAL FILM

James Kenny
Isabel Enriquez Kenny

INTRODUCTION: Brief History of the Project

In August of 1983 the eyes of the world were focused on the Philippines following the assassination of Benigno "Ninoy" Aquino, Jr. The murder was blamed on the Marcos administration which subsequently tried to prove its innocence. Interestingly, the exercise was undertaken for the benefit of the United States government and its people rather than for the Filipinos. This and the events which followed can best be explained by the unique relationship between the two countries dating back to the Spanish-American War of 1898. We knew that the American public generally was unaware that the Philippines had been the United States' first and only colony. It was then that we conceived the idea to make a film on this formative period in U.S. foreign policy. As we conducted our preliminary research into the history, we were struck by the astonishing number of parallels between the Philippine-American war and the Vietnam war. Our initial findings confirmed our decision to present this period of history in a feature film rather than a documentary film because the historical events lent themselves to cinematic visualization. We planned to use fictional characters against the backdrop of actual events to dramatize larger themes which remain enormously significant today for both the Philippines and the United States. One recent film that used this approach successfully was Peter Weir's *Year of Living Dangerously*.

Subsequently, as our careers permitted, we continued to compile notes on this period. In 1986, we met Raul Manglapus, a former Philippine Senator who was then living in exile in the United States. (He is currently a Philippine Senator and serving as Foreign Minister in Philippine President Corazon Aquino's administration.) As a research fellow at Harvard University, his field of study was American-Philippine relations. During our lively discussion on the topic, he mentioned his research fellowship at Cornell University when he first arrived in the United States. There he delved into the history of the Philippine-American war and decided to write a play, a musical no less, about the subject rather than a paper. We compared notes and once again our hopes of going on with our film were rekindled.

HISTORICAL BACKGROUND

Prelude. In 1521 a Spanish expedition led by Ferdinand Magellan discovered the Philippines and so began 377 years of colonial rule over the 7,100 islands comprising the archipelago. During this period the colonizers had a profound impact on Philippine culture. Aside from the obvious adoption of Spanish language, customs, clothing, and surnames, the Spanish system of government and social castes left an enduring imprint on the Filipino psyche. Nearly 90 percent of the population converted to Catholicism. Jose Rizal, nineteenth century Filipino nationalist and novelist, argued that it was largely through the efforts of the Spanish clergy that his countrymen remained loyal to the mother country.

Throughout the Spanish period there were isolated uprisings which were quickly squelched by superior Spanish forces. It was, however, the execution of Fathers Gomez, Burgos, and Zamora in 1872 which became the rallying point of Philippine nationalism. These three Filipino secular priests had been the leaders of a "secularization movement" which demanded the appointment of Filipino priests rather than Spanish friars to the parishes.

The colonial government stepped up its persecution of Filipino intellectuals who called for reforms. Many young Filipinos went abroad to study and speak out against Spain's oppressive regime in the Philippines. Foremost among them were Rizal, Marcelo H. del Pilar, and Graciano Lopez-Jaena, the leaders of what became known as the "propaganda movement." The aims of this movement were non-revolutionary, arguing for reform not independence. The movement ended in December, 1896 when Rizal was executed by a firing squad.

Rizal's death also fanned the flames of a growing armed revolution which had started a few months earlier. Among the revolutionary leaders, Emilio Aguinaldo emerged as one of the most valiant and successful generals. In March of 1897 he was elected the president of the new revolutionary government by an assembly of its leaders. Although the Filipinos enjoyed some early successes in their battles with the Spaniards, Aguinaldo's government soon found itself in retreat. Primo de Rivera, the Spanish governor-general of the islands, knew that the revolution could not be crushed by force so he offered a pact by which the revolutionary leaders would go into exile in Hongkong in exchange for amnesty for all who lay down their arms and monetary compensation. Aguinaldo accepted and his party arrived in Hongkong in December 1897.

The Spanish-American War. Following several resolutions passed by the U.S. Congress, one of which demanded that Spain evacuate Cuba, Spain declared war on the United States on April 24, 1898. The following day the United States declared war on Spain. A week later Admiral George Dewey was in Manila Harbor with orders to destroy the Spanish fleet.

On May 1, 1898 Dewey destroyed the Spanish fleet without losing a single ship. Aguinaldo hurried back to the Philippines and was welcomed by Dewey, who knew that the Americans would need Filipino assistance in defeating the Spanish land forces. By June, Aguinaldo's army had proved Dewey right by taking almost every province in Luzon, the largest island where Manila is located. Meanwhile, American troops were landing almost daily around Manila.

On August 13, 1898 the "siege of Manila" began. It soon became apparent to Filipino and American troops that a "face-saving" deal had been arranged between the Spanish governor and the Americans. The Spaniards did not want to surrender to the Filipinos. When the Americans reached Manila 7,000 armed Spaniards were waiting for them with a white flag draped over the city wall. Out in the trench zone Americans tried to restrain the Filipinos as Spanish soldiers retreated and surrendered to the Americans. American and Filipino soldiers cursed and occasionally fired at each other as they ran down the road. Somehow this fighting did not escalate beyond these minor skirmishes. By the end of the day the Filipinos had been barred from the city and the Americans were raising the American flag over Fort Santiago.

In the days following the takeover of Manila, the city returned to its normal routine but the relations between Filipino and American troops remained uneasy. General Wesley Merritt wanted to "stamp out" the insurgents "once and for all," but Washington advised against any such actions. Aguinaldo and his 30,000-man army remained outside the city limits.

On September 15, 1898 Aguinaldo convened a congress in Malolos comprised of the most gifted Filipino intellectuals. The next day, the first order of business was the ratification of the declaration of independence. Over the course of the next few months the congress set about its work of organizing the new government and writing its constitution.

Although Aguinaldo and his cabinet were deeply suspicious of the United States' motives in the Philippines, the Treaty of Paris caught them completely off guard. It was in this document that the U.S. made plain its intention to make the Philippines its first colony. The signing of the treaty forced Aguinaldo to side with radicals in his cabinet who had been demanding armed resistance against the Americans for months.

The Philippine-American War. In the United States a small Boston-based group which called itself the Anti-Imperialist League was committed to fighting against the ratification of the treaty in Congress. President McKinley was startled to find that its passage would not be automatic. A day before the vote in the Senate a full-fledged conflict erupted in the Philippines when two American privates crossed into an area held by the Philippine army and shot three approaching Filipino soldiers. In the United States the reaction was one of outrage. By most newspaper accounts the Filipinos had initiated the hostilities and they must be made to pay dearly for it. The treaty passed easily although one Senator questioned the suspicious timing of this incident in relation to the Senate vote.

During the next few weeks the Americans won large, decisive victories over the retreating Filipino troops. Even at this stage there were charges brought against Americans accused of killing unarmed captives during these maneuvers. Yet as the Americans moved forward relentlessly taking new ground they did not realize that this was part of a pattern of warfare that had existed for hundreds of years in the Philippines. The Spaniards had won battles such as these countless times. Defeat, however, never deterred the Filipinos, who after a time would resort to guerilla warfare and harassing operations. In any case, Aguinaldo was patient and knew he had the support of the peasantry. Slowly this pattern began to reveal itself to the American field commanders when after major drives they would be ordered to return to Manila and the insurgents moved back into captured territory.

In 1900 guerrilla warfare intensified even though the American military set up an ever growing number of outposts throughout the archipelago. For the American soldier this type of warfare was unnerving. Where the Americans set up a local government the insurgents would set up a shadow government. Aside from the guerillas, their other major enemies were the climate and the terrain.

Aguinaldo, after weeks of close pursuit by General Sam Young and his troops, escaped over the Benguet Mountains and found refuge in Isabella province. His last order to his commanders before disappearing was to fight the war using only guerilla tactics. With the American troop strength at its peak size of nearly 60,000 men the Filipinos had no other alternative. They knew they could not win but they might hold out until William Jennings Bryan and the Democrats won the next election.

In November 1900 the Filipinos' last hope was dashed when Bryan lost his election bid to McKinley. They were running low on cash, supplies and ammunition. With the elections over and the Republicans firmly in control, General Arthur MacArthur placed the islands under martial law. Some prisoners were deported to Guam and seventy-nine others were executed for war crimes. The final prize of the war, Aguinaldo, remained elusive until one of his couriers was caught and persuaded to talk. In late February of 1901 Aguinaldo was captured in his headquarters by General Frederick Funston. Although the effort was futile, the war continued until the final Filipino general surrendered in September of 1903. In all, over 5,000 Americans and 16,000 Filipinos died in action and another 200,000 civilians died from famine and pestilence.

THE RESEARCH PROCESS

A. Literature Review

The initial phase of the research began with the compilation of a thorough bibliography and a chronology of the historical events dating from 1896 to 1903. This review revealed a rich diversity of scholarly and anecdotal accounts of the war and the American colonization of the Philippines from the perspectives of American and Philippine historians, journalists, soldiers, and studies of the period conducted by the American government. As the historical scholars go about the process of piecing together the events leading up to and during the conflict, they attempt to explain its political, economic, socio-cultural, and racial underpinnings. These discussions were useful in focusing the primary and secondary themes which will eventually be woven into the fabric of the film's storyline, characters, and visual imagery. Yet the emotional and spiritual core of the film emerges from the descriptive accounts of the war as told by its participants. In official documents and letters to loved ones people on both sides of the conflict describe what they saw, what they felt, and what they thought about the war, the country, the climate, and the people.

Fortunately, this era contains a wealth of photographic records as well. War-time photography dates back to Mathew Brady's photographs of the Civil War and by the time that this conflict had erupted there were no shortage of photographer-correspondents sending back pictures of the war. Moving pictures, on the other hand, had only recently been invented. Although we have yet to find actual footage taken in the Philippines, the films originating in the U.S. tell us something of Americans alive at the time. This is particularly true of staged patriotic short films which were shot in the U.S. but depicted battle scenes in the Philippines. For example, a Thomas Edison film dramatizes American soldiers advancing on Filipinos who fall before them as a prominent soldier waves an American flag center screen.

Both the photographs and the films provide invaluable insights into these two very different societies. For instance, photographs of the Filipino elite reveal a picture of a proud, highly educated, and cultured social group who felt they were ready to govern their own country. It is not hard to imagine how dismayed they must have felt when the Americans revealed their intentions to take up the colonial stewardship of the Philippines. Moreover, as one looks into the eyes of those involved in the conflict, new characters who will people the film begin to emerge and other characters are refined and filled out. There is an attitude or feeling in a still picture which cannot be entirely conveyed by print records.

A primary source of photographic records was located in the Philippine consulate in New York where we found books written by Filipino historians. We also found an invaluable resource in a huge volume entitled *Harper's History of the War on the Philippines*. The book contains visuals depicting battle scenes, the uniforms used by the soldiers of both armies, the newspapers in circulation at the time both in Manila and in the U.S., manifestoes and communiques used by both sides, the buildings as well as the people's social lives - the dresses in vogue at the time, the songs, poems, the period's arts and crafts, hobbies, past-times, etc. In short, it gave us a very good sense of the world at the time in terms of visualizing the characters and scenes of our film.

B. Commitment to the Project by Historical Scholars

In pursuit of meticulous historical accuracy, the next phase of our research brought us to contact historical scholars of the period. They include:

Dr. John Larkin, a Philippine-American war scholar, who has written numerous articles on the encounter and its repercussions. In addition to being a recipient of a Fulbright lectureship in the Philippines, he has done a good deal of research in the National Archives in Manila, in parish registers, diocesan records, and the archives of major religious orders. Dr. Larkin has expressed that he has long thought that the conflict lent itself to cinematic representation and was keenly enthusiastic to hear that such a project was in the planning stages. He brings a wealth of understanding of the period and the issues.

Dr. Bonifacio Salamanca, an historical scholar specializing in Philippine-American relations, who has also written many articles on the war and its aftermath. Currently, he teaches at the University of the Philippines and he has offered to assist us in our research efforts. Like Dr. Larkin, Dr. Salamanca is a senior scholar who brings to the project an impressive research background and a willingness to commit himself.

Dr. Carol Petillo, an historian with American foreign policy expertise and an associate professor at Boston College, who has written a book entitled *Douglas MacArthur: The Philippine Years* as well as a number of articles on general foreign policy issues and others dealing specifically with the Philippines. She has already been enormously helpful in locating archives and books on the Philippine-American war era. She also has provided us with a list of American scholars who are specialists in this period. Dr. Petillo plans to meet with us regularly to review our findings, direct our research efforts and critique drafts of our treatment and script.

Linda Ty-Casper, Philippine novelist, who has authored over ten books of fiction two of which, *The Three Cornered Sun* and *Ten Thousand Seeds*, were set in this period. She has done extensive background research for her novels and has offered to share this information with us. Ms. Ty-Casper also has researched her books in many of the libraries and museums in the Philippines and the United States that we plan to visit and has offered to guide and facilitate our research efforts.

Dr. Leonard Casper, an English professor at Boston College and an author/editor of six volumes on the culture of the Philippines, who has written extensively on Filipino literature and society. He also has received two Fulbright lectureship in the Philippines. Dr. Casper will be able to contribute to this project a lifetime of study of the culture, the literature and the people. His insight will be particularly helpful in assuring the authenticity of character psychology and values as well as the details of dress and social customs.

Raul S. Manglapus, Foreign Minister of the Philippines, who has been a research fellow at Cornell and Harvard Universities. While at Cornell his area of study was Philippine-American relations at the turn of the century. He has written several papers and a play based on the period. Although his duties prohibit an extensive time commitment, he will be of great assistance by virtue of his position in the government in helping us to network with scholars, film production people and financial backers when we travel to the Philippines. He is in the unique position to open doors to government agencies and the scholarly community which will assure the most efficient use of our time for research and establishing connections for future stages of the project.

Throughout the various stages of the project we have been and will be consulting with these scholars. As we approached each one, we were impressed with their enthusiastic support of our idea and our approach. Their collective knowledge of the events, the players, and the cultures is an essential foundation for recreating this time period and the historical moments through which the fictional characters can pass. In our conversations with them we are always on the lookout for those anecdotes which somehow bring the war and its meaning into sharp focus.

C. Archival Research

The next step in the research process involves visits to archives which contain actual materials from the period:

The Army War College in Carlisle, Pennsylvania which contains letters from soldiers who wrote home from the Philippines during the war. From the letters we have already seen quoted in various books this will provide an invaluable glimpse into the soldiers' view of the war and the Filipinos. More than any other source, the letters of those who lived through the events make the war seem a tangible reality. These are people we know looking at the war through a different lens, experiencing the same pain, the same confusion that is so reminiscent of the American soldiers who fought in Vietnam.

The National Archives in Washington, D.C. houses a military archive division which contains official military documents and reports. These collections offer a revealing look at U.S. military objectives as well as their methods of dealing with the Filipinos. We are particularly interested in examining a file located here which deals in explicit detail with atrocities committed during the war.

Amauan, a Philippine organization based in New York City, has a small archive of materials from both Philippine and American sources of the time. They have provided visual and written materials for a play based on the period by Raul Manglapus as mentioned earlier.

The Philippine National Library in Manila contains letters and military documents from the Filipino vantage point. We are most interested in finding out how Filipino opinion of the Americans evolved. How did they compare to previous colonial masters? Once again, anecdotal information is critical.

The Lopez Museum and the library at the Ateneo de Manila University, both located in Manila, can provide us access to artifacts and other important materials on the social mores of the period.

D. Location Survey

Although the complete survey for each scene's location is done after the script is completed and prior to the production, we plan to do a preliminary survey of the locations as part of our research. Again, this is necessary since we are working on a historical film where each visual element plays an important part in the film's credibility. The locations will include whatever actual locales and structures from the period that are still in existence as well as reconstructions of sets and locations based on our research.

E. Visualizing the Script

The final stage in the research process includes:

- The organization and review of the information collected.

- Writing the film treatment which is a detailed narrative description of the storyline, the characters and the settings.

- Continued consultation with the historical scholars listed earlier. These scholars have detailed information about the war and the people who fought in it.

- Collaboration with Loring Mandel on the development of the script. Mr. Mandel is an Emmy-award winning television and film scriptwriter who has committed to work closely with us in the development of the treatment and the script.

Although the events are based on history, the fictional film allows the scriptwriter to harness the power of visual symbols. As in *Year of Living Dangerously*, a movie based on events in Indonesia leading to the revolution during Sukarno's rule, the filmmaker Peter Weir used the Indonesian puppets to raise his characters to the level of mythical heroes, to illustrate the life and death imagery which pervades Indonesian philosophy and culture. The movie also used the character of the dwarf, who is of both Western (Australian) and Indonesian descent, as helper to the hero, matchmaker and eventually the film's social conscience. He is the only character able to straddle both worlds, but he is torn apart by the powerful internal cross currents.

Days of Empire, the working title of our film, is an historically based dramatic film which explores the devastating impact of American expansionist policy on the Filipino people's hopes for independence following the Spanish-American war. The story opens two years before the outbreak of hostilities with the execution of the Philippine national hero, Jose Rizal and it ends with the capture of the commanding general and first president of the short-lived Philippine Republic, Emilio Aguinaldo. The opening sequence is used to set the theme of the need for self determination and Filipino pride. In the historical accounts of his execution it is mentioned that Rizal requested to face his executioners but was refused. As he fell, he twisted his body so that his face was looking up at the sky.

The film's fictional characters are also used as visual symbols aside from their roles in the story. A deaf-mute girl, who is unable to scream out as she is raped, is a symbol of the Philippines, a country without a voice, unable to speak out as its destiny is being determined by other countries. The major characters include one who represents the Filipino educated elite. Another character embodies the well-intentioned American caught in the crossfire of idealism and imperialism. A journalist and his colleague, a photographer, filter the events of the war through their cultural lenses. A "mestiza" (part Filipino and part Spaniard) lacks a national identity which is symbolic of the country itself whose history has been neatly summed up as: "Three centuries in a Catholic convent and fifty years in Hollywood."

Larger political implications of foreign policy decisions, America as a world power, the idealistic American character as well as racial themes are explored in the film's visualization.

Descriptive accounts of historical events, people and places such as the following excerpts from Leon Wolff's book *Little Brown Brother* are going to be used as reference for the film's visual design. For instance, for the film's opening sequence on the execution of Jose Rizal as mentioned earlier, the following description of the event is invaluable:

> Rizal, a dark, muscular, rather handsome man with wavy hair, was driven along Malecon Avenue one brilliant morning to the main park of Manila, the famous Luneta. It was the social event of the year. Breakfast parties were held on the Old Walls, and Spaniards of both sexes looked on from their carriages. There was many a VIVA!, much laughter and applause, all this in contrast to the throngs of silent Filipinos. Troops held them back and artillery was trained upon them. Rizal was not allowed to face his executioners. When the volley hit him he fell and, with a final act of will, twisted his body to face the sky.

Descriptions are also abundant of the primary setting, Manila in the 1890s, which had a population of over a third of a million and was the center of culture and commerce:

> The city was divided sharply into two sections. The Old City was completely surrounded by a Vauban-type stone wall, three centuries old, no part of which was less than 30 feet high and 40 feet wide. Upon this astonishing structure the Spaniards had mounted 300 obsolete cannons.... Moats adjoined the walls. The new, or extramural, city lying across the Pasig was twice the size of the old. Most neighborhoods had separate names (Binondo, Malate,Tondo, etc.) but they were all really Manila, a sprawling organism

66

> featured by dark, narrow streets. Especially in the walled section it possessed a somber, monastic atmosphere.

Beyond the crowded confines of the city, it was in the provinces where the majority of the population resided:

> Here homes were nipa huts raised on stilts, to avoid small animals and floods. To enter the door, one climbed a ladder. Windows were of braided thatch. To see outside, one removed them.Streets were dusty lanes that resembled their counterparts in the back-country of Arkansas and Mississippi.

The surrounding countryside, however, was quite alien to most American soldiers:

> Over all the rivers flimsy railed bridges swayed. Everywhere the foliage grew incredibly dense - between the houses, lining the roads, and in increasing profusion as the outskirts of the village merged with the jungle, where monkeys chattered and nature held sway.

Other descriptions of routes of travel through this unfamiliar terrain illustrates the immense difficulty the Americans encountered once the conflict evolved into guerrilla warfare. The roads were alternately described by the natives themselves as either "malos caminos" (bad roads) or "muy malos caminos" (very bad roads).

Aside from the settings, historical sources provide glimpses into the lifestyle of the people themselves whether they lived in the squalid slums of Manila's Tondo section or in the privileged sections occupied by the Filipino elite. Scenes and images of cockfights, ribald theaters, plush hotels, packed churches, and oppressive cigar factories are colorfully detailed. One recurring theme concerns the nature of the Filipino character. Most commentators remark on their courteousness to friends and strangers alike. Their social orientation demands allegiance to family and social group members which supercedes all other obligations or individual needs or interests.

In addition, there has been much written about the behavior of the Americans and how they reacted to their new role as colonizers.Leon Wolfe, for instance, comments on how the Americans "seemed like giants to the natives":

> Fierce-looking, unshaven, wearing wild west hats, they loafed and smoked, visited the shops, strolled the streets, flirted with Filipino girls and played with "pickaninies."

It also was soon apparent that the Americans carried the baggage of their prejudices with them.

> Almost without exception, soldiers and also many officers refer to the natives in their presence as "niggers" and the natives are beginning to understand what the word "nigger" means.

After the takeover of Manila by the Americans antagonism between the two armies grew steadily with each side taunting the other.

> U.S. patrols took pleasure in stopping Filipino officers in the Old City and searching them before the eyes of their fellow natives.

In spite of all indications that the American intentions were less than honorable, the leaders of the rebellion moved forward in their attempt to establish a legitimate Philippine government. John Barrett, a reporter for the *Review of Reviews* who covered the congress called by Aguinaldo to set up the Philippines' revolutionary government in Malolos in September 1898, and attended many of the sessions wrote:

> The executive portion of the government was made up of a ministry of bright men who seemed to understand their respective positions. Today few doubt that they would have governed the islands adequately. Theirs was the first democratic constitution in Asia.

After the war broke out, American soldiers were engaging in practices usually associated with the "savages" they were fighting. A Missouri infantryman wrote home:

> I don't know how many men, women, and children the Tennessee boys did kill... They would not take any prisoners.

Americans also became accomplished in the "water cure" torture. As Wolff describes it:

> A blend (in the words of an observer) of Castilian cruelty and American ingenuity, it consisted of forcing four or five gallons of water down the throat of the captive, whose "body becomes an object frightful to contemplate," and then squeezing it out by kneeling on his stomach. The process was repeated until the "amigo" talked or died. Almost invariably he talked.

Private A. Barnes of the 3rd Artillery wrote to his brother in Indiana:

> Last night one of our boys was found shot and his stomach cut open. Immediately orders were received from Gen. Wheaton to burn the town and kill every native in sight; which was done... I am probably growing hard-hearted, for I am in my glory when I can sight my gun on some dark skin and pull the trigger... Should a call for volunteers be made for this place do not be so patriotic as to come here.

During maneuvers in the countryside the American troops had to contend with the tropical climate and diseases while in pursuit of insurgents who knew the terrain well and used it to their advantage:

> Many Americans dropped from exhaustion; often it was necessary to descend hundreds of feet for water in the streams below. Single-file the men knifed through the tall grasses, with only their heads and shoulders in view. Sometimes the retreating amigos, as they moved along these same faint trails, slashed the brush and interlaced the branches on both sides. This they did in two quick motions, greatly slowing down their enemy...

Ultimately, Aguinaldo was taken prisoner. His capture was a spear through the heart of the revolution. It dragged on for the two years which followed, but without his symbolic leadership the hope of independence had to wait another forty years.

The primary problem of the dramatic recreator of historical periods is to determine the focus of the script. Certainly it is clear that there exists an abundance of visually provocative material, but the writer and director must chose which actual events are most telling of the entire conflict and of American involvement in the Philippines and which lend themselves most to the dramatic form. What time frame will be used? Should the film limit itself to a few days in the war or should it perhaps skip through time picking up its characters at different moments in their development? Should the story be told from the point of view of one character or would it be more revealing to tell it from multiple points of view? The answers to these questions will be determined to some extent by the form. A two hour film is much more restricted than a television miniseries stretching over three or four nights. We made the decision on this project to use the two hour feature film format because a tight storyline can have a good deal more powerful emotional punch than a rambling story told over many nights. Thematically, it also provides a more tightly woven message. The temptation is to try to cover everything to assure accuracy of historic detail and chronology. However, the dramatic form does not permit such comprehensive treatment. Its strength is not in the quantity of detail it can present but in its symbolic treatment of a microcosmic moment to provide insight into the whole encounter. The object is to explore the spiritual-emotional aspects of the war. It is a history of our biases, of our assumptions about other cultures, of our vision of the American role on the world stage.

CONCLUSION

The creative process involved in the development of a film is not as linear a process as is the research portion. It is ongoing as we go over the information we have gathered, as we are busy preparing a meal or as we drive to work. Our scriptwriting consultant, Loring Mandel, has mentioned how research always has been the favorite part of his profession. There is perhaps a certain enviable freedom in the research phase when one is free to explore every aspect of an idea, an issue, or an historical period. Scriptwriting is a refining process, a boiling down to the bone. The long and winding, thickly populated historical story must be transformed into a tersely told, highly condensed version. It is a broadly drawn sketch which focuses on the microcosmic world of its characters to hopefully reveal something of an entire historical period. This can be a tortuous process but it can also be quite fulfilling when the pieces of the mosaic begin to fall into their seemingly predestined places.

Bibliography

Blount, James H. *The American Occupation of the Philippines, 1898-1912*. New York & London: G.P. Putnam & Sons, 1912.

Church, A. Timothy. Personality Research in a Non-Western Culture: The Philippines. *Psychology Bulletin*. 1987

Gates, John Morgan Gates. *Schoolbooks and Krags*. Westport, CT: Greenwood Press, 1973.

Harpers' History of the War in the Philippines.

Karnow, Stanley. *In Our Image*. NY: Random House, 1989.

Larkin, John A. *The Pampangans: Colonial Society in a Philippine Province*. Berkley: University of California Press, 1972.

Rizal, Jose. *El Filibusterismo*, trans. Charles Derbyshire. Manila: Philippine Education Company, 1912.

Rizal, Jose. *Noli Me Tangere*, trans. Charles Derbyshire. Manila: Philippine Education Company, 1912.

Salamanca, Bonifacio. *The Filipino Reaction to American Rule, 1901-1913*. Norwich, CT: Shoe String Press, 1968.

Stanley, Peter. *A Nation In The Making*. Cambridge, MA: Harvard University Press, 1974.

Stanley, Peter. *Reappraising An Empire*. Cambridge, MA: Harvard University Press, 1984.

Thompson, James C., Jr., Peter Stanley, John Curtis Perry. *Sentimental Imperialists*. NY: Harper & Row, 1981.

Ty-Casper, Linda. *Ten Thousand Seeds*. Quezon City, Phil.: Ateneo University Press, 1987.

Ty-Casper, Linda. *The Three Cornered Sun*. Quezon City, Phil.: New Day, 1979.

Williams, William Appleman. *The Tragedy of American Diplomacy*. Cleveland: World, 1959.

Wolff, Leon. *Little Brown Brother*. Garden City, N.Y.: Doubleday, 1961.

WHITE SPACE, GRAPHICS, AND TEXT

Nancy Nelson Knupfer
Marina Stock McIsaac

As personal computers and desktop publishing software become more sophisticated and easier to use, more and more people are designing and producing materials via desktop publishing software. Unfortunately, many of those people have minimal, if any, training in instructional development, page layout, or good graphic design techniques for such materials. This is of particular concern as teachers and trainers produce materials for students using desktop publishing techniques. Along with many easy to read and nicely designed pieces, we have seen several pieces of reading material that seemed to be obstructed by the particular placement of the graphics within the text.

BACKGROUND

Principles for text design have recently been developed for use by instructional designers (Hartley, 1985; Heines, 1984; Jonassen, 1982). One text variable, layout, has been found to significantly affect readers' speed and comprehension. But the layout variables in text research (type style, upper-lower case, character attributes, line length and justification) do not address the question of graphic content or placement. Graphic designers emphasize the importance of using white space for balancing text, positioning graphics as the dominant visual element , and improving the aesthetics of the page layout (Parker, 1987). There is little reported research on graphic placement in instructional text and none that has produced guidelines for instructional use of graphics with the emerging computer software programs (Isaacs, 1987).

Because recent versions of some popular desktop publishing software boast the advantage of various text-wrap techniques and text column definitions, we launched upon an investigation to determine if the new technique of wrapping text tightly around a graphic had any advantage over the older technique of boxing the text around the graphic. We also measured whether or not multiple text columns had any advantage over single columns.

Our previous study, "Desktop Publishing: The Effects of Computerized Formats on Reading Speed and Comprehension," (Knupfer & McIsaac, in press) investigated the effects of two modes of text placement around graphics within an informative piece of reading material. The two modes were "run-around text" and "wrap-around text." Run-around text is text which frames a graphic with straight edges like a picture frame (see Figure 1). Wrap-around text flows around the graphic in a way which conforms to the shape of the graphic (see Figure 2). Both run-around and wrap-around text feature automatic repositioning of text around a newly inserted or newly adjusted graphic. And, both methods allow the text to be adjusted with respect to being closer to or farther away from the edges of the graphic, but the run-around text with its straight-framed edges will always have some amount of white space between the graphic and the text. The wrap-around text, on the other hand, can be adjusted to fit quite snugly against the graphic if desired; it also can be adjusted to allow greater or lesser degrees of white space between the graphic and the text while still conforming to the shape of the graphic. Using 60 subjects, the study investigated the effects of run-around and wrap-around text, and single versus double text columns on reading speed and comprehension.

The design of the first study was a two by two (2X2) completely crossed, between subjects, factorial analysis of variance. Independent variables included text-graphic format (run-around and wrap-around text) and text columns (single and double column). Dependent measures included reading speed and gain in comprehension as measured by the difference between the pre- and post-test scores. The alpha level for significance was set at .05.

Significant main effects were found for text format (run-around and wrap-around), but not for number of columns. It took students significantly less time to read wrap-around (tightly hugged) text than run-around (boxed). Students also demonstrated larger gains in reading comprehension when reading wrap-around text than when reading run-around text.

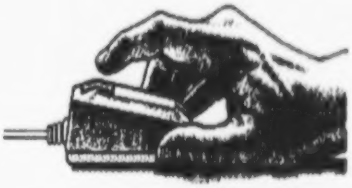
Contrary to what one might hypothesize, irregular lines of text around a graphic did not confuse the readers in this study. The new enhancements currently available to desktop publishing software, particularly the wrap-around features, were not found to inhibit reading. Instead, reading comprehension scores increased and reading times decreased when the text was "uptight" against the graphic.

Examination of the results suggested that adding white space surrounding a graphic might have a significant effect on the ease with which text is read. Thus, the distance between words of text, rather than the shape of the text when it surrounded a graphic, might have affected reading speed and comprehension in this study. An alternative explanation could be that, in some circumstances, right justified text inhibited comprehension when compared to unjustified text (Jonassen, 1982). Although the text was right justified on all page and column margins in this study, the run-around text was further justified by being boxed evenly around the graphic. It appeared that the smaller distance between words or the conformation of the text to the shape of the graphic, enabled by the wrap-around feature, had a positive effect on both reading time and comprehension.

PURPOSE OF THE STUDY

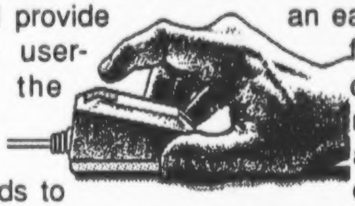
Based upon those results and the common graphic design practice of considering the importance of white space (Parker, 1987), a follow-up study was conducted to determine whether increasing the amount of white space surrounding the graphics made a significant difference in reading speed and comprehension, when text was in the wrap-around format. This study asks the following questions: What is the optimal placement of text and graphic? How and where should white

FIGURE 1
Run-around Text



Ventura, *Pagemaker*, and *Spellbinder* do so much more. All three are complete, true desktop publishing packages, but there are some differences. Both *Ventura* and *PageMaker* are linked to "window" programs; *Ventura* used *GEM*, and *PageMaker* had *Microsoft Windows*. These "front ends" use presetup printer specifications and provide an easy way to import files, making the programs very user-friendly. Both programs use menus with icons of the choices available to the user, and both support the mouse as an input device. *Spellbinder* has no front end and needs no mouse — this program used dot commands to do everything, similar to *WordStar's* format. All three programs support a variety of laser printers, but only *Ventura* and *Spellbinder* also support dot matrix.

FIGURE 2
Wrap-around Text



Ventura, *Pagemaker*, and *Spellbinder* do so much more. All three are complete, true desktop publishing packages, but there are some differences. Both *Ventura* and *PageMaker* are linked to "window" programs; *Ventura* used *GEM*, and *PageMaker* had *Microsoft Windows*. These "front ends" use presetup printer specifications and provide an easy way to import files, making the programs very user-friendly. Both programs use menus with icons of the choices available to the user, and both support the mouse as an input device. *Spellbinder* has no front end and need no mouse — this program used dot commands to do everything, similar to *WordStar's* format. All three programs support a variety of laser printers, but only *Ventura* and *Spellbinder* also support dot matrix.

space be located to improve reading comprehension? At what point does the integration of text and visual adversely affect legibility? How close to the visual should the text be placed?

METHOD

Subjects

One hundred, one students from an introductory computer literacy course at a major university in the Southwest participated in the study. The elective course was a 400 level class which was offered to meet a General Studies numeracy requirement. Students were sophomores, juniors, and seniors who had little or no previous exposure to computers. The study was conducted at the beginning of the school year and all students in the course participated.

Materials

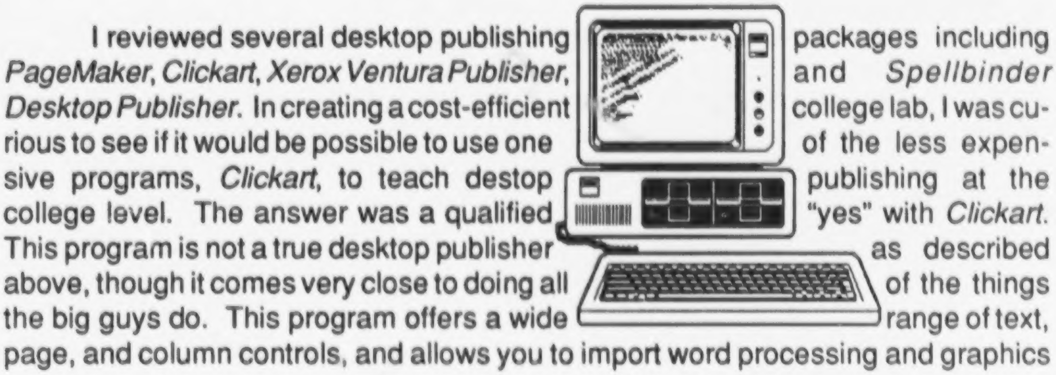
Readings. Readings included approximately six pages of informative text about hypercard and desktop publishing. These materials were chosen because the topic was relevant to the subjects and because the reading level was geared for the general public as opposed to technical readers. The topic was suited to a novice audience with no prior knowledge about either hypercard or desktop publishing. The text was analyzed using the Flesch-Kincaid Readability formula and was found suitable for college students at the 11th and 13th grade levels.

These reading materials were the same as those used in the prior study with the exception of the text-wrap and number of text columns. Two sets of reading materials were used for this study. Both included as much consistency as possible: the same text and graphic content, placement, and size; right justification throughout; and text wrapped on both sides of each graphic. Both sets used the wrap-around text in which the text conforms to the shape of the graphic, but one set had the text tight to the graphic (see Figure 3) while the other set had approximately one quarter inch of white space between the graphic and the text (see Figure 4).

The graphics, which were selected from existing clip-art files as those which were likely to be popularly used, were the same as those used in the previous study. Although related to the context of the readings, the graphics were simple, pictorial style and did not contain extra information to reinforce or elaborate on text. Graphics were of variable size in relation to the text, but each was used consistently within the study materials. Each corresponding graphic was the same size and shape throughout both sets, and was placed physically and contextually in similar positions.

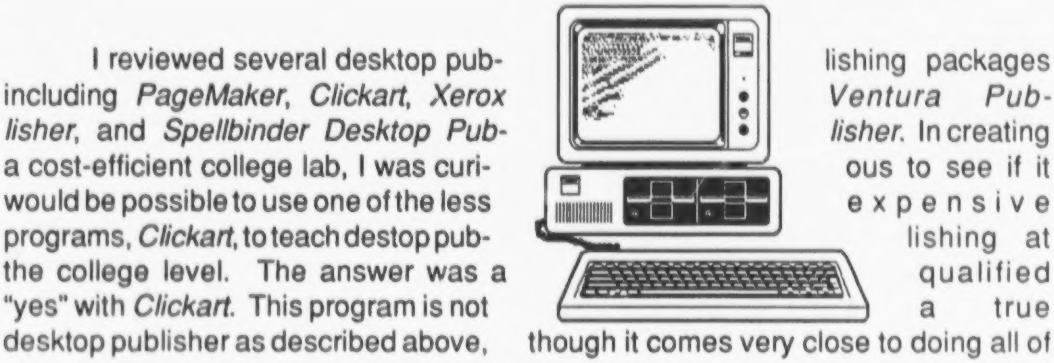
Pre- and Post-Tests. To measure the students' comprehension of the reading material, pre- and post-tests were developed from key concepts which the authors extracted from the readings. No test items were dependent upon information contained in the graphics. The tests were developed and validated during a pilot phase of the project, and were identical with one exception. The post-test contained an additional six-question attitude section about the students' judgement of the difficulty of content, the degree to which graphics interfered with their comprehension and reading speed, their degree of interest in the subject, and their overall understanding of the material after reading it. These attitude questions were

FIGURE 3
Wrap-around Text Tightly Fitted



I reviewed several desktop publishing packages including *PageMaker, Clickart, Xerox Ventura Publisher,* and *Spellbinder Desktop Publisher.* In creating a cost-efficient college lab, I was curious to see if it would be possible to use one of the less expensive programs, *Clickart,* to teach destop publishing at the college level. The answer was a qualified "yes" with *Clickart.* This program is not a true desktop publisher as described above, though it comes very close to doing all of the things the big guys do. This program offers a wide range of text, page, and column controls, and allows you to import word processing and graphics

FIGURE 4
Wrap-around Text with 1/4 Inch White Space



I reviewed several desktop publishing packages including *PageMaker, Clickart, Xerox Ventura Publisher,* and *Spellbinder Desktop Publisher.* In creating a cost-efficient college lab, I was curious to see if it would be possible to use one of the less expensive programs, *Clickart,* to teach destop publishing at the college level. The answer was a qualified "yes" with *Clickart.* This program is not a true desktop publisher as described above, though it comes very close to doing all of measured on a Likert-type scale and were not included in the post-test comprehension score.

Procedure

Materials were distributed during a regular 75 minute class period. All subjects were given a pretest to determine their comprehension of the subject prior to reading. The test included 34 multiple choice and 11 fill-in-the blank questions. Students were free to take the time they needed to complete the test. When all were finished, the pretests were collected. Next, the two sets of reading materials were randomly distributed to the students so that each student received one set of articles. Each set included two articles formatted for one of the two treatments: wrap-around with no white space and wrap-around with one quarter inch white space. Students were instructed to read through the text once without hurrying. When each student was finished reading both articles the reading time was recorded. When all students had completed the readings, they were given the post-test for comprehension. Students were allowed as much time as they needed to complete the test.

RESULTS

Table 1 shows the mean scores for the pretest, postest, gain, and time elapsed. The group with tightly-wrapped text had a lower mean pretest score, a higher mean postest score, a higher mean gain between pretest and postest scores, and a faster mean reading time than the group with white space between the graphic and the text. However, t-tests with alpha .05 revealed that those differences were not significant between the two groups; white space variation did not make a difference.

TABLE 1
Mean Scores

	Pretest	Postest	Gain	Time
Tight Wrap	17.04	48.08	31.04	10.98
White Space	18.09	41.72	23.62	11.92

CONCLUSION

Although not statistically significant, differences in the mean scores between groups indicate that increasing the amount of white space might increase the differences between groups. In this study, one quarter inch of white space was selected. Results suggest that the study should be replicated using 1/3 or 1/2 inch of white space compared to tightly wrapped text. Future studies should compare various amounts of white space and their relationship to wrap-around text to determine whether white space is, indeed, a significant variable. In the previous study, white space and justification were the two controls which were varied to produce the significant difference between wrap-around and run-around text. The present study used wrap-around to investigate the difference created by white space vs. no white space Although the 1/4 inch border of white space did not result in a significant difference here, principles of perception suggest that varying the amount of white space might result in differences in reading speed and comprehension.

Determining the amount of white space for future studies should be based on perceptual principles such as; proximity, similarity, continuity, and closure. These four processes, by which the mind organizes meaning, depend on how physically close the objects are, how similar they are, whether there is a continuous line to guide the eye, and whether the minimal amount of information is present that is necessary to obtain meaning or closure. Reading speed and comprehension are directly affected by the way the mind organizes meaning from the placement of graphics and text. The question needs to be asked, "At what point does the amount of white space surrounding a graphic enhance or inhibit reading of the text?"

Finally, the possible effects of right justification of text, combined with the use of white space, upon reading speed and comprehension should be explored. The mind perceptually organizes not only white space but the grouping of text which surrounds the graphic. Justified text may provide the appropriate visual stimulus to help provide closure or it may inhibit lateral eye movement as the reader's eye seeks continuity of meaning. Both amount of white space and text justification should be explored to determine the optimal placement of graphics within text.

REFERENCES

Hartley, J. (1985). Designing instructional text. (2nd ed.). New York: Nichols.

Heines, J. (1984). Screen design strategies for computer assisted instruction. Bedford, MA: Digital Press.

Isaacs, J. (1987). Text screen design for computer-assisted learning. British Journal of Educational Technology, 18 (1), 41-51.

Jonassen, D.H. (1982). The technology of text. Englewood Cliffs NJ: Educational Technology Publications.

Knupfer, N.N. & McIsaac, M.S. (in press). Desktop Publishing: The Effects of Computerized Formats on Reading Speed and Comprehension. Journal of Research on Computing in Education.

Parker, R.C. (1987). The Aldus guide to basic design. Seattle: Aldus Corporation.

DEVELOPMENT OF VISUAL-SPACIAL UNDERSTANDING IN FIFTH GRADE FEMALES

John C. Belland
Sally Trethewey

There continues to be considerable debate about the differences in performance of males and females on various learning tasks. Among the continuing concerns is the lower performance of females in mathematics, science and technical areas. "At every stage of the pipeline, we lose women," reported Phyllis Moen, director of the sociology program at the National Science foundation (Berger, 1989, p. 23). She goes on to say that we lose women when they choose courses in junior high and high schools and later when they choose college majors and areas for graduate study.

Of course, there are many possible and plausible explanations for women's choosing to study and to select careers in fields outside mathematics, science and technology. Among them are cultural influences which presume that females should act differently as they grow up both in school and play and in adult roles (Berger, 1989). Other explanations include teacher bias (boys are called on more often than girls in class), sex hormones may alter the brain, girls are taught to be dependent, and girls have few role models to emulate in science and other related fields (Kolata, 1989; Keegan, 1989; Roberts, 1989).

If one focuses on the notion of hormonal influence on brain processing, Kolata (1989) reports that Resnick and Berenbaum found that the only significant differences they measured between girls with disorders which alter the sex-hormone concentrations in the brain before birth were in three of five tests of spatial ability. On the other hand, Gagnon (1985) found that college age females who initially scored lower on tests of mental rotation could be trained to score at parity with males with the experience of just a few hours of playing video arcade games. Thus one might be led to wonder whether the hormonal levels measured by Resnick and Berenbaum were a cause of lower spatial learning performance or an effect of lack of appropriate educational experience. In Gagnon's study, college men also received the same treatment but did not improve their spatial scores. This suggests that if a learner already has adequate spatial visualization skills, she or he is not likely to be affected by visual-spatial instruction.

While Gagnon's work is well done and interesting, it does not address the question of whether any deficiency in spatial skills can be remedied before young women begin to be lost to mathematics, science and technology in the early stages of the "pipeline" mentioned above. Statistically significant different performance of boys and girls in spatial skills begins in pre-adolescence–*i. e.*, in the middle grades. Thus, it seemed to be appropriate to investigate whether some visual experiences could be designed which could improve the spatial performance of fifth grade girls. One could have chosen many different instructional experiences for use as a treatment, but we chose to use a commercial 3-D imaging software package, Easy 3-D™, on Macintosh® computers. Belland *et. al.* (1988) reported that even though a CRT display is physically two dimensional, people are able to interpret cues of three-dimensionality in such a display. This technology allowed the learner to control the manipulation of the objects which were displayed. The time required for the computer to calculate the image of the object to be displayed in a new position or in a new size allowed the learner time to try to form a mental image which would predict the image to be displayed by the computer. The average time for computer calculation was eight seconds.

Procedure

Prior to the onset of this project, the students, both boys and girls in the selected fifth-grade class, had experience with Macintosh computers. They were familiar with the mouse and the keyboard. They had completed writing projects using MacWrite™, 2-D drawing projects using MacPaint™, and had compiled a stack of book reviews using Hypercard™.

The learners were pre- and posttested with the Group Embedded Figures Test (Witkin, 1971). The test was administered by one of the investigators. The classroom teacher was present, but did not participate in the testing. The students and parents were informed that the test and the activities to follow would not in any way affect grades. They were told that the purpose of the study was to observe the development of spatial abilities as a result of interaction with the Macintosh® and the 3-D software.

The investigator worked with the students at the computers in the classroom while the regular classroom teacher was conducting other small group activities. This investigator visited the classroom once a week for six weeks.

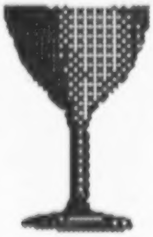


Figure 1. This goblet is available in the files supplied with Easy 3-D™. It is represented in three dimensions so that the computer can transform its image to represent different points of view.

On the first day, the students were called to the computers in pairs and encouraged to explore the functions of stretching and squashing an image of a goblet (see figure 2). The goblet image was selected since it was an easily identifiable shape from many different points of view. The students were encouraged to discuss with each other what they discovered. Each pair was able to explore for approximately 10 minutes.

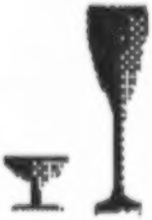


Figure 2. The left goblet has been squeezed to 50% of its former height while the right goblet has been stretched to 200% of its former height.

During the second week, the students were introduced to the rotation function of Easy 3-D™. One student was called to each of the five computers and was given instruction on how to use the rotation function. Once the student understood the assignment he/she chose someone to work with as a partner. The first student then "taught" the partner. Once again the students were encouraged to discuss what they had discovered. After approximately five minutes, the first student was replaced and a new partner was chosen. The new partner was taught by the remaining member of the former diad.

During the third and fourth weeks, the students, once again working in pairs, brought up the goblet and then draged the mouse to indicate the number of degrees that the goblet would be rotated (see Figure 3). Before they released the mouse button, and the goblet was reconstructed on the monitor, they were instructed to anticipate and discuss:

1) where they thought the goblet would reappear, and
2) which way the stem would be aimed.

Once they made a decision that they could agree upon they:

1) pointed to that location on the monitor,
2) released the mouse, and
3) checked the reconstructed visual image of the goblet against their anticipated version.

Thus they were to anticipate mentally what would happen and then visually check to see how closely they had imaged the results.

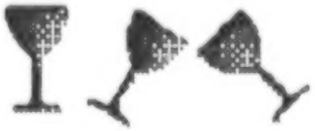


Figure 3. The goblet can be rotated by the software to the left or right (which is all we asked the students to do in this project). Objects can also be rotated toward or away from the "viewer." A scale in a window tells the number of degrees.

In the fifth and sixth weeks, the students played a game we created called Squash and Stretch. This was done individually but with two students at the computer. A goblet was brought up on the screen. Each student was given a piece of acetate and an overhead projector marker. The investigator drew a box on the acetate which was 50% shorter than the image on the screen. The student's tasks were:

1) to anticipate how the goblet would look when squeezed or stretched to fit the outlined box on the acetate,
2) to draw it on the acetate.

After the students had each drawn their picture, the instructor brought up the image on the monitor and the student could match her/his picture with the computer-generated image. The students were encouraged to discuss how their drawing compared to the image on the screen.

Data Analysis

A purposive sample of one classroom of 23 fifth grade students who attended and inner-city Columbus Public Schools classroom was selected. This school included a majority of students from racial minorities. Nearly all the students came from homes at or below the federal poverty level. This sample was selected in order to assess possible effects on a population most "at risk." In addition, the sample was selected because the school population was stable and the classroom teacher and principal were willing to communicate with the homes of the learners to obtain permission for the learners to participate in the study.

Research question. For the population of students represented by an inner-city midwestern, fifth-grade class, what is the difference between the pretest and posttest scores on the Group Embedded Figures Test for boys and girls who experience a weekly series of 3-D visual experiences on a computer during a six-week period?

The null hypothesis. There will be no difference between pre-and posttest scores of the fifth-grade learners on the Group Embedded Figures Test (GEFT).

The alternative hypotheses. There are three alternative hypotheses:

H_1. There will be an improvement in the scores on the GEFT by girls..
H_2. There will be an improvement in the scores on the GEFT by boys.
H_3. There will be an improvement in the scores on the GEFT by all learners.

The data. The mean improvement of the scores for the females was 2.0 (S.D. = 2.50). The mean improvement of the scores for the males was 2.7 (S.D. = 2.21). The mean improvement score for both groups–male and female was 2.2 (S.D = 2.39). The descriptive data and the results of the two-tailed paired t-tests are presented in Table 1 below. All of the calculated values of t were derived by using the differences between paired means.

Table 1
Pre- & Posttest Means for Subjects on the Group Embedded Figures Test

Group	n	Pretst Mean	Posttst Mean	t	Sig.
Female only	16	3.1	5.1	3.20	.01
Male only	7	3.9	6.6	3.24	.01
Both	23	3.3	5.5	4.45	.001

Testing H_1. For the females only, the calculated value of t was 3.20. The critical value of t was + or - 2.81 (df = 15) at the alpha $p>.01$ level. Therefore, the null hypothesis is rejected at the $p>.01$ level as $3.20 > 2.81$.

***Testing* H_2.** For the males only, the calculated value of t was 3.24. The critical value of t was + or - 2.819 (df = 6) at the alpha p>.01 level. Therefore, the null hypothesis is rejected at the p>.01 level as 3.24 > 2.81.

***Testing* H_3.** For the population of both males and females, the calculated value of t was 4.45. The critical value of t was + or - 3.792 (df = 22) at the p>.001 level of significance. Therefore, the null hypothesis is rejected at the p>.001 level as 4.45 > 3.792.

By referring to Table 1 and the above discussion, it can be inferred that there is a significant difference in the before and after scores of the females only group, the males only group, and both males and females group. Thus all three null-hypothese were rejected. Given the constraints of the one group pretest posttest design, it was not possible to determine whether the increase in the GEFT scores is different for the males and females.

Discussion

This study was a pilot study performed with a small sample of learners from an intact group. It included a series of simple visual exercises to encourage learners to make a mental image of the representation of a three-dimensional object as it was transformed in shape and rotated in space by the computer. The measurement of the effects of these exercises was by the Group Embedded Figures Test which is certainly not an adequate instrument to measure 3-D imagery but which surely measures a learners ability to hold the mental image of a shape in mind long enough to identify it in a complex drawing. In addition, the learners presented such low scores on the pretest GEFT that it is likely that they could show an increased score on the posttest. Thus, the results of this study must be interpreted with great caution.

Nonetheless, the findings are striking. Even under the constraints of few degrees of freedom and the additional constraint imposed by the investigators of using a two-tailed test, the levels of significance are very strong. We believe that the substantial improvement in GEFT scores resulting from the treatment will be replicable with larger samples which are more representative of the population of fifth-grade learners. It will be interesting to see if the differential effect Gagnon observed in her treatment on college-age males and females can be replicated in fifth-grade learners who are more representative of a normal population of fifth-grade learners. It is possible that the visual-spatial skills of fifth-grade boys, while more advanced than that of girls, is still not developed optimally for age and developmental level. Thus, any visual-spatial training which would improve such skills for girls will also improve those same skills for boys. It will also be interesting to see whether it is as easy to measure a change when we work with samples of learners who produce a much higher pretest score.

There needs to be an intensive effort to improve the validity of the measurement in this line of inquiry. It seems reasonable that some combination of items which test mental rotation, perspective vs. orthographic representation, and visual manipulation would begin to measure important outcomes of the visual treatments. We can only speculate that when we develop and standardize a more appropriate measure for the 3-D aspects of the experience, that instrument will also indicate strong gains.

Qualitative data gathered during the study suggest some other interesting lines of inquiry. Learners initially working with the software seemed genuinely puzzled and made many errors. This sort of behavior persisted until all of a sudden a learner would say, "I think I've got it." After that point, the learner would respond correctly most of the time and indicate a lot of pleasure with her/his performance. The contrast between the performance and attitude before the moment of discovery and afterwards was dramatic. These data suggest that the process involved is visual and wholistic–not propositional and incremental. Once they had experienced the "aha," there did not seem to be a need for the learner to "talk" her/his way through a visual manipulation. At first they couldn't see it and then they could. At this point, we believe that such behavior confirms the ideas of imagery theorists such as Pavio(1983), Shephard (1984), Kosslyn, (1983), and Cooper (1983) in contrast to those of proposition theorists such as Pylyshyn (1981). However, additional data should be gathered in future studies to probe students for statements about what seems to be going on in their thinking. In this way, it may be possible to find subtile evidence of incremental learning which was not measured in the present study.

References

Berger, J. (1989) "All in the game." *The New York Times, Education Supplement,* Summer.

Cooper, L. (1983). Analogue representations of spatial objects and transformations. ERIC No. ED 240536.

Gagnon, D. (1985). "Videogames and spatial skills: An exploratory study." *Educational Communications and Technology Journal, 33*-4, 263-276.

Keegan, P. (19890 "Playing favorites." *The New York Times, Education Supplement,* Summer.

Kolata, G. (1989). "Mind blowing?" *The New York Times, Education Supplement,* Summer.

Kosslyn, S. (1983). *Ghosts in the mind's machine.* NY: W. W. Norton & Co.

Pavio, A. (1983). "Emperical case for dual coding." in J. Yuille (Ed.) *Imagery, memory and cognition: Essays in honor of Allen Pavio.* Hillsdale, NJ: Erlbaum.

Roberts, E. (1989). "Factors working against women in computer science." Unpublished draft manuscript.

Shephard, R. (1984). "Ecological constraints on internal representation: Resonant kinematics of perceiving, imaging, thinking and dreaming. *Psychological Review, 91*-4, 417-447.

CHILDREN'S RESPONSES TO IMAGES OF THE SOUTHWEST

John Warren Stewig

It is a common writing instruction shibboleth that authors write most effectively about their own first-hand experiences. Does it also follow, by extension, that readers understand best and respond most positively to writing and illustrations which reflect their own first-hand experience? This conference provided an opportunity to test out this assumption in using with children some books about the American southwest.

The collaborative work of Byrd Baylor, author, and Peter Parnall, artist, provided the children's books to be explored with youngsters. For a long time these two have worked together, producing many books about the southwest which have been widely praised by children's literature experts. Huck (1987) called the books "well-written and attractive," while Norton (1987) described them as "strikingly presented." Reviewers in periodicals have similarly praised the books, commenting positively on both text and pictures, though, in fact, some reviewers have raised questions about the books' ability to communicate with child readers. The books have been praised, for example, as "spankingly attractive and splendidly attuned," but at other times have been criticized as, for example, "a technical triumph without great joy." (Excerpts from representative reviews are included in the Appendix.) Do these books, lauded by adult experts, also appeal to children? There is ample evidence that adult and child taste differs (Terry, 1974).

Materials

Four books by Baylor and Parnall were used:

Desert Voices (Scribners, 1981),
The Other Way to Listen (Scribners, 1978),
The Way to Start a Day (Scribners, 1978), which was named a Caldecott Honor Book, and
Your Own Best Secret (Scribners, 1979).

Procedures

To elicit response from children, the books were used in three classes of fifth graders, in urban, suburban, and rural schools. All children in class took part in each one hour lesson, though some of the research data was gathered and is reported from a subset of the total group. On two days, two of the books, presented in random order, were used. The books were read as the pictures were shown by the researcher, and at the conclusion children were encouraged to discuss their reactions to both text and pictures. After one book was read and discussed, children filled out a form asking them to rank order the book on a 5 point continuum from "very interesting" to "very dull." They also indicated whether they would choose to read the book again by themselves. After this, the second book was read and discussed and the form filled out. On the third and final day the four books were briefly reviewed, and children commented on what they noticed about each book. Then, the question was explored: "Why might someone choose a book as their favorite?" Children gave reasons for a preference and these were listed on the board, in two categories: visual reasons and text reasons. Following this, children were given time to write their preference statement. All four books were available so children could consult them if necessary. Students were encouraged but not required to write about both text and pictures as reasons for choosing. They were told to use any words they wanted, not worrying about spelling which would be corrected later, so that mechanical considerations would not limit their expression.

Rank Order Responses

Data in this section are reported from all students, a total N of 75 (43 male and 31 female). The following rank orders are based on adding together the two most positive response categories ("very interesting" and "somewhat interesting"):

Rural (N=28)

Desert Voices	11
The Way to Start	7
Your Own Best	7
The Other Way	6

Suburban (N=18)

Your Own Best	10
Desert	8
The Other Way	8
The Way to Start	6

Urban (N=29)

The Other Way	15
Desert Voices	14
Your Own Best	12
The Way to Start	9

The following rank orders show preference by sex:

Boys		Girls	
Desert Voices	22	Your Own Best	16
The Other Way	17	The Other Way	12
Your Own Best	13	Desert	11
The Way to Start	13	The Way to Start	9

When we compare boy and girl total scores for the four books, we find boys are more positive than are girls for all the books except for Your Own.

The second type of data gathered on the forms was a response to the statement, "I'd choose to read this book again." The yes results were:

Rural

Desert Voices	15
Your Own Best	7
The Other Way	6
The Way to Start	5

Suburban

Your Own Best	8
Desert Voices	7
The Other Way	6
The Way to Start	4

Urban

Desert Voices	15
The Way to Start	10
The Other Way	10
Your Own Best	9

Next, we compared the number of positive responses to negative ones (meaning the child would not choose to reread the book). In the rural and urban groups, only one book, Desert Voices, earned more positive than negative responses. In the suburban group, no book received more positive than negative responses to the statement.

When this data is analyzed by sex, these results were obtained:

Desert	Yes	No
Boy	26	18
Girl	12	18

The Other Way		
Boy	14	26
Girl	8	24

80

Your Own Best		
Boy	15	27
Girl	10	21
The Way to Start		
Boy	12	31
Girl	7	22

Across all four books, boys a total of 67 times replied yes to the question of rereading a book, while 102 times said no. In contast, girls replied yes a total of 37 times, and no 85 times.

Choice Responses

To do the more extended analysis of written reasons for choosing a particular book, we selected samples from a subset of the total group. The sample children were chosen before the study began by each classroom teacher, who was asked to identify 5 each in high, medium, and low language use groups, for a total N of 15 in each class. This way of choosing subjects is recommended by Dyson (1984). As a result of this pre-study identification of students, we had a very evenly divided group of 45 Ss: rural (7 male, 8 female), suburban (6 male, 9 female), and urban (8 male, 7 female).

Analysis

To analyze this data, three different language measures were used; two are quantity while one is a quality measure. We tallied the number of sentences generated, and the total number of words generated. These two quantity measures are often used as rough estimates of language maturity (Loban, 1976).

The quality measure, a type/token ratio, is often used by language researchers (according to Jensen, 1973) as an indication of language maturity. This reports the number of different words (called types) per given sample (called tokens). The researcher chooses the number of tokens to be used (in this case, 50 words) and then crosses out every repeated word. What is left is the type-token ratio, an indication of language diversity. For example, 25/50 is a less diverse sample than 36/50. Analysis of the language generated showed the following:

Rural School	Low	High
Number of Sentences	1	12
Number of Words	26	167
Type-Token Ratio (50 words min.)	31	47

Suburban School	Low	High
Number of Sentences	4	10
Number of Words	36	122
Type-Token Ratio (50 words min.)	33	45

Urban School	Low	High
Number of Sentences	2	10
Number of Words	42	147
Type-Token Ratio (50 words min.)	29	46

In the final session, when children chose one of the four books and wrote about their reasons, which books did they select? We found the following:

Rural

Desert Voices	7
Your Own Best	7
The Way to Start	1
The Other Way	0

Suburban

Your Own Best	6
Desert Voices	4
The Way to Start	3
The Other Way	2

Urban

Desert Voices	8
Your Own Best	4
The Way to Start	2
The Other Way	0

In addition to choosing, Ss wrote the reasons for their choices. To facilitate fluency, a discussion period was held as described earlier. What sorts of comments did children include? Each piece of writing was read, and the sentences categorized to determine if the child was writing about text or pictures. The analysis showed:

	Text Comments	Picture Comments
Rural school	39[1]	38
Suburban	41	17
Urban	31	37

Children made many different kinds of text-related comments:

Rural School

Text comments

1.	characters	10
2.	general ("It is well written.")[2]	5
3.	plot ("She found all the notes he had left.")	4
4.	animal narrators	4
5.	setting	4
6.	page layout ("She writes in columns because she wants to have more room for pictures.")	3
7.	number of topics ("I like books that tell about only one subject.")	2
8.	link to child's own experience ("William had his own stuff, and I would like to have my own if my little brother wouldn't steal them.")	2
9.	amount of words ("There was a lot of reading but that's ok.")	2
10.	time	1
11.	vocabulary	1
12.	author	1

Illustration comments

1.	color[3]	17
2.	general	5
3.	objects/places shown	5
4.	concealed objects	5
5.	amount of detail	2
6.	realism	1
7.	time of day	1
8.	comparing pictures to others in book ("It's interesting how some pictures are almost the same and some are super different.")	1
9.	relations between objects ("Another reason I like this book is she shows how big mountains are to people.")	1

Suburban School

Text Comments

1.	general	7
2.	specific details ("She tells you things that couldn't happen and you normally wouldn't think of.")	7
3.	topic "I love animals.")	7
4.	link to child's own experience	7
5.	about the author ("She has a very imaginative mind.")	4
6.	plot	2
7.	page arrangement	3
8.	characters	2
9.	compare to other books ("All the other books were about one thing repeating over and over again.")	2

10.	book page arrangement ("On the title page and dedication page he drew it and you found out he meant to continue it.")	1
11.	setting	1
12.	presentation ("It was read with a lot of expression.")	1

Illustration comments

1.	color	5
2.	concealed objects	5
3.	general	2
4.	design	2
5.	realism ("The pictures are so real it makes you feel like you're right there.")	2
6.	page layout ("I like where she puts the pictures.")	1

Urban School

Text Comments

1.	plot	8
2.	general	6
3.	link to child's own experience	4
4.	point of view ("I like that the animals are doing the talking.")	4
5.	page layout	4
6.	amount of detail	3
7.	named animal ("My favorite was the lizard because you had to look closer.")	2
8.	mood ("It was a calm book.")	1
9.	parts of book ("The title fits this story.")	1

Illustration comments

1.	color	17
2.	concealed objects	6
3.	size of objects ("She made the sun small then big at another time.")	3
4.	general ("I chose this because of the illustrations.")	3
5.	amount of detail	3
6.	objects/places shown ("I like how she drew William Cottonwood's place.")	2
7.	overall quality ("The pictures are bright and cheery."	1
8.	changes in illustration throughout book ("The faces of the sun are different in each picture.")	1
9.	agreement ("The pictures show what the words tell."	1

Conclusions

The children in these three fifth grades participated with enthusiasm, orally and in writing, when encouraged to interact with four books highly regarded by children's literature experts. The fact that the books represented a geographic area, and lifestyles quite unlike their own did not seem to interfere with the students' participation.

The rank order data, gathered from the total N of 75 Ss, presents a mixed picture: in each location, rural, suburban, and urban, the children chose a different book as most highly ranked. Rural children chose Desert Voices, in which individual animal narrators tell briefly of their everyday lives. Suburban children chose Your Own Best, a praise poem for having a secret place, that begins in the southwest, as all the books do, but also talks about secret places in a variety of other locations in this country. The urban children chose The Other Way, which is set in the southwest and focuses largely on the positive relationship between a young girl and an old man.

When this ranking data is reorganized by sex, we find boys most often ranking Desert Voices most positively, while girls ranked Your Own Best most positively.

Children were also asked if they would choose to reread these books again. In the urban and rural group, the book Desert Voices received more positive than negative votes. The suburban children responded less positively than the other groups: no book received more yes than no votes.

When this data was analyzed by sex, for all four books, more boys responded yes than did girls, though in fact boys' and girls' no votes outnumbered yes votes for all the books except one. In Desert Voices, boys' yes votes outnumbered their no votes. It is clear from this, then, that the books, while stimulating children to talk and write about their responses during the class activity, did not fare well as books children would, on their own, pick up and read again.

A second part of the data gathering involved students in choosing a favorite from among the four books and writing about their reasons. The writing from a subgroup of 45 Ss was analyzed. This choice data revealed things about children's ability to generate language, about the most often chosen books, and about the types of reasons children give when choosing.

When we consider the quantity and quality of the language generated, results are similar to those in a study which used different schools (Stewig, in press). The language urban children generated was very comparable with the language generated by rural and suburban children, though urban children are widely thought to be less skilled in using language than are other children. For these urban children, the use of picture books was an effective stimulus to written language.

When choosing, both rural and urban groups preferred Desert Voices, while the suburban students chose Your Own Best. In looking at a quantification of the comments made, in both the rural and urban school, comments were quite evenly split between text and illustration comments. In the suburban group, however, comments were much more heavily text rather than picture oriented.

The range of the comments is wide, despite the fact that talking about picture books isn't a regular part of the curriculum at this grade level in any of the three schools.

This project involved fifth grade students, an age older than that at which children typically study picture books in depth, with a sequence of lessons designed to explore responses to books about the southwest. The visually unfamiliar geography, as well as lifestyles unlike their own, did not prevent these children from responding energetically both verbally and in writing. In the process, they provided data which indicated that children can choose with sureness and write articulately about reasons for choices. The study suggests that teachers can choose to use picture books with older students, and need not limit the books only to those depicting the children's own lives.

Bibliography

Dyson, A. H. (1984). Learning to write/learning to do school: Emergent writers' interpretations of school literacy tasks. *Research in the Teaching of English*, *18*, 233-264.

Huck, C. S. et al. (1987). *Children's literature in the elementary school*. New York: Holt Rinehart and Winston.

Jenson, J. M. (1973). A comparative investigation of the casual and careful oral language styles of average and superior fifth grade boys. *Research in the Teaching of English*, *7*, 338-350.

Loban, W. (1976). *Language development: Kindergarten through grade twelve*. Champaign, IL: N.C.T.E.

Norton, D. E. (1987). *Through the eyes of a child*. Columbus, OH: Charles E. Merrill Publishing Co.

Stewig, J. (in press). Choosing the Caldecott winner: fifth graders give their reasons. *Journal of Youth Services in Libraries.*

Terry, A. (1974). *Children's poetry preferences: A national survey of upper elementary grades*. Urbana, IL: National Council of Teachers of English.

Appendix

Each of the four books used was well reviewed when first published.

1. *The Other Way to Listen*

"This paean to silent sounds...is expressive and insinuating, as the Baylor-Parnall collaborations always are....(b)ut the picture-pages are cold and all-too-calculating, the images both ambiguous as to form and literal as to meaning..." (*Kirkus*, V. 47, #3, February 1, 1979, p. 119).

"The artist's distinctive settings and strong, beautiful portraits...set in pages of varied design, the book is a tribute to the idea that spareness is effective. The flowing sketches with minimal lines are brightened by the addition of yellowish orange; the short text does not have an unnecessary word. (*Horn Book*, V. 55, #3, June 1979, p. 291)

Another reviewer had limited praise:

"A technical triumph without great joy, this is a cold, graceful book ... for most children, this narrative of tuning in will not be ... exciting...." (*School Library Journal*, V. 25, #8, April 1979, p 39).

2. *The Way to Start a Day*

"...strikingly illustrated...this book offers exciting possibilities...and help(s) sensitize children to the beauty of their world and their language..."(*Reading Teacher*, V. 32, #8, May 1979, p. 974)

"Though urging a return to simpler societies' obeisance to nature has become a pious cliche,....Baylor can still make the invitation as newly compelling as the rise of each day's sun....Parnall's decorative style....his crisp lines and sun colors are still spankingly attractive and splendidly attuned." (*Kirkus*, V. 46, #15, August 1, 1978, p. 805.)

"The author's sensitive, singing prose will certainly convince readers....Parnall's glittering paintings alternative between swirling shapes in the vibrant hues of the sunrise and strong, equally stunning geometrics...." (*Publisher's Weekly*, V. 214, # 7, August 14, 1978, p. 69)

"The vertical columns of Baylor's prose poem....sit unassumingly outside the dry brightness of Parnall's spreading scenes; his stiletto lines insinuate themselves forcefully into part real/part fantasy...in full accord with the surety and aplomb of the text. No new directions...but stunning nevertheless." (*Booklist*, V. 74,# 22, July 15, 1978, p. 1731)

3. *Desert Voices*

"...achieves a clarity and beauty that surpasses even some of their own best work.... The essential nature of each animal... is conveyed with simplicity and energy in the well-phrased text and is further illuminated in Parnall's drawings....bold and delicate. Rich colors used sparingly, careful choice of detail and striking page design all focus attention on the animals while conveying a larger sense of its being. The pictures are less convoluted and the ideas less esoteric than some of the previous collaborations, so that this is more accessible and appealing to children." (*School Library Journal*, V. 28, #1, September 1981, p. 104)

"Baylor's prose has, as usual, a certain mesmerizing quality....but there is no connection between the segments except for the reverential tenor of the whole (which somewhat blunts the intrinsic survival message) ... youngsters who've responded to earlier ... collaborations will likely find the combination of the precise and the impalpable, common to both text and pictures, affecting in this instance, too." (*Kirkus* , V. 49, #12, June 15, 1981, p. 733).

"Baylor and Parnall, whose names are nearly synonymous with picture books on the desert, take another unique look at the arid world with these evocative poems.... The stiletto lines of the drawings reflect the sharp contours of the land...." (*Booklist*, V. 77, #21, July 1, 1981, p. 1393)

4. *Your Own Best Special Place*

"This tribute to solitude is sensitively interpreted in earth-tone illustrations. The combined artistry of Baylor's words and Parnall's illustrations has never been more effective." (*Childhood Education*, V. 56, #3, January 1980, p. 168)

"... warmer and more human than ... *The Other Way to Listen* .... This part of the story is totally absorbing and evocative. But the book goes on--a little too long--as ... the girl think(s) about other secret places ... illustrations are as fastidious as ever .... But despite its grand Southwestern set, this book should have been scaled down to better suit the secret, nestling subject." (*School Library Journal*, V. 26, #6, February 1980, p. 42)

"Still another intense evocation of the impalpable ... the pictures are if anything more dematerialized than ever--large areas of undifferentiated color, a few slopes of line, some tiny, remote figures--and so, with the involuted text, the outreach is minimal, the sheltering comfort of a 'secret place' nil." (*Kirkus*, V. 47, #16, August 15, 1979, p. 931)

"Parnall's sweeping vistas suggest the majesty of spaces... and they echo the poetic telling by Baylor who shares a dear experience....in a gently-touching text that will go straight to the heart of child readers who cherish their particular private havens." (*Publishers Weekly*, V. 216, #10, September 3, 1979, p. 96.)

"....captured the essence of a very personal discovery and in wistful, gentle tone, expresses the significance .... Parnall's familiar, thin, reaching lines have the sharpness of an etching; they converge in a novel way to build the unique perspectives that make his work striking. Use of wide space forces attention to the heart of each illustration and emphasizes the aloneness of the characters. Carefully controlled shadings...are....effective and emphatic; the uncluttered look suits the quiet, reflective tone of the prose." (*Booklist*, V. 76, #4, October 15, 1979, p. 348.)

Endnotes

[1] Throughout this section, members do not necessarily total the subject N indicated above, as Ss were encouraged to write as many different reasons for their preference as they wished.

[2] Exemplary comments are included in this first section; additional comments are given in succeeding sections only for new categories.

[3] There seem to be three kinds of comments about color:

a. quantifying ("There should have been more color.")
b. describing ("I like all the light colors.")
c. naming ("The sun was yellow.")

Stewig.0/newresp
10/31/89

IS ARTISTIC STYLE A FACTOR IN CHILDREN'S BOOK SELECTION?

WHAT CHILDREN PREFER AND WHY THEY PREFER IT

Inez L. Ramsey

Adults develop, select, and utilize a wide range of illustrations in tradebooks and textbooks for children. Although these illustrations add significantly to development and publication costs, children, the ultimate consumers, are seldom included in the design, selection, or utilization process. What do children prefer in pictorial design? How do they interact cognitively and affectively with pictorial illustrations? Do design aspects of illustrations in children's tradebooks and textbooks influence children's selection of and interaction with accompanying text? Smith (1960) stated that one rationale for including illustrations in children's tradebooks was the ability of pictures to motivate children to read the accompanying text. From a marketing perspective, can publishers maximize the appeal of illustrations in children's picture books and other pictorial materials, based upon children's preferences for elements of artistic design?

Researchers have concluded that the following elements of pictorial design influence children's picture preferences:

(1) Color (Miller, 1938; Rudisill, 1952; Amsden, 1960; Stewig, 1974; Myatt and Carter, 1979),

(2) Subject content (Rudisill, 1952; Rump and Southgate, 1966; Clegg, 1968),

(3) Pictorial complexity (Stewig, 1972; Myatt and Carter, 1979),

(4) Artistic technique/medium (Flowers, 1978), and

(5) Artistic style (Miller, 1938; Rudisill, 1952; Amsden, 1960; Matchotka, 1966; Sloan, 1972; Myatt and Carter, 1979; Ramsey, 1982).

It is the purpose of this paper to:

(1) review literature on children's preferences for artistic styles commonly employed in picture book illustration, and

96

(2) report the results of this author's research on first, second, and third grade children's verbal responses regarding why they preferred pictures which were developed utilizing different artistic styles.

This study is an extension of previous work by this researcher investigating primary age children's preferences for and cognitive interaction with artistic styles commonly employed in the development of children's tradebooks and textbooks.

BACKGROUND/REVIEW OF THE LITERATURE

Within the body of the children's picture preference literature, a small research base has identified artistic style as a factor which influences children's picture preferences (Mellinger, 1932; Miller, 1938; Rudisill, 1952; Bou and Lopez, 1953; Amsden, 1960; Lam, 1966; Sloan, 1972; Myatt and Carter, 1979; Ramsey, 1982). Artistic style is defined as the mode of expression employed by an artist in interpreting pictorial content. Styles may vary from highly realistic to highly abstract representations of a subject. Style is generally discussed in terms of categories of style, such as cartoon, representational, or cubist (Mayer, 1969, p. 383).

Literature on children's preferences for artistic styles can be broken into three primary groups: (1) studies in which children selected a preferred picture from a series of pictures, in isolation from accompanying text; (2) studies in which children selected a picture which they felt best illustrated accompanying text; and (3) studies in which children were asked to supply verbal reasons for their picture preferences.

Research studies, in which children were asked to select a preferred picture from a series of pictures, in isolation from accompanying text, have concluded that artistic style affects children's picture preferences. Researchers in the majority of studies have concluded that children prefer realistic art styles.

This researcher (Ramsey, 1982), in an earlier study, concluded that primary age children preferred cartoon and photographic art styles, when they selected pictures in isolation from text. Sex and grade level did not influence primary age children's preferences in that study. This original study served as the foundation for the current research activity. In that study, unlike many previous investigations of children's style preferences, design elements such as color, subject content, artistic technique/medium, and quality of illustration were controlled. This study differed in result from earlier studies in determining a preference for cartoon art. This researcher suggested that children's heavy viewing of cartoon style art in television programming had influenced some children's style preferences. In a post hoc investigation related to the primary investigation, children strongly asserted that they viewed photographic style as related to representations of reality or "real things," while they equated cartoon style with representations of "make-believe" or "pretend" situations. These children's verbal comments suggested that they employed artistic style as a yardstick for measuring the realness or pretendness of the accompanying text content.

A few researchers have asked the question, "Do children prefer different artistic styles to illustrate different forms of literary content?" A corollary to this question is, "Do children employ artistic style as a yardstick for measuring the degree of reality of accompanying text?" Work by Sloan (1972), Lucas (1977), and Ramsey (1982) suggests that children prefer different artistic styles to illustrate different forms of literary content. Sloan (1972) reported that children preferred realistic art to accompany informational text and stylistic art with narrative text. Lucas (1977) found that fifth graders preferred photographs to illustrate biography and poetry. Children in that study preferred impressionistic art with legends. This researcher (Ramsey, 1982) noted that primary age children preferred photographs with informational text and cartoon art with fanciful animal stories. The results of that study provided support for the conclusion that children employ artistic style as a yardstick for measuring the reality or fantasy of accompanying text.

Some researchers have addressed the question of why children prefer specific illustrations. Moore (1972) and Matchotka (1966) investigated children's verbal responses to the question of why they preferred certain illustrations. These studies were not limited to an investigation of art styles. Moore (1972) found that children made objective statements about the content of pictures. Matchotka (1966) reported that subject content and color statements were most frequently made by six-year olds.

THE STUDY

The purpose of this research (Ramsey, 1989) was to extend the work of Moore (1972) and Matchotka (1966) to an investigation of first, second, and third grade children's preferences for differing illustrative styles and their verbal responses as to why they had selected the preferred style.

Two hundred and sixty four first, second, and third grade children participated in the study. Children were randomly assigned to two specially developed picture sets which featured animal subject content. Each picture set was developed from an original photograph. Each photograph was reproduced in three distinctive illustrative styles: representational, expressionistic, and cartoon. Photographic style was defined as a colored photograph of the subject (Sloan, 1971, p. 29). Representational style was defined as an artist's rendition of the subject which conforms to the subject in its true form (Sloan, 1971, p. 29). Expressionistic style was defined as an artist's rendition of the subject which leans heavily towards abstraction (Sloan, 1971, p. 29). Cartoon style was defined as an animated caricature of the subject (Sloan, 1971, p. 29). In the three illustrations developed to complete the four picture set, subject content, color, artistic medium, artistic technique and quality of illustration were held as constant as possible within the limitations set by style.

Testing was performed by a trained administrator on a one-to-one basis in a quiet area of the school. Following a specified procedure, the administrator had each child view the four pictures in the picture set. Position within a set was randomly assigned. After viewing each picture for a specified period of time, the child was asked the question, "If you were going to the library to get a book, which one of these pictures would you most like to read about?" The child was then asked, "Why would you like to read about this picture?" The administrator recorded the child's responses.

The researcher analyzed children's verbal responses, employing a classification scheme developed from the work of Moore (1972) and Matchotka (1966). The researcher tested the classification model employed in a prior field study. The following categories were used in classifying the data:

(1) The total picture. This category included broad descriptive statements about the picture, such as, "It's pretty."

(2) The style of the picture. This category included statements which identified the specific artistic style, such as, "I like cartoons" or "I like photographs."

(3) Realism. This category included statements, such as, "I like it because it is real."

(4) The object depicted. This category included statements about the picture content or actions depicted in the picture, such as, "I like rabbits."

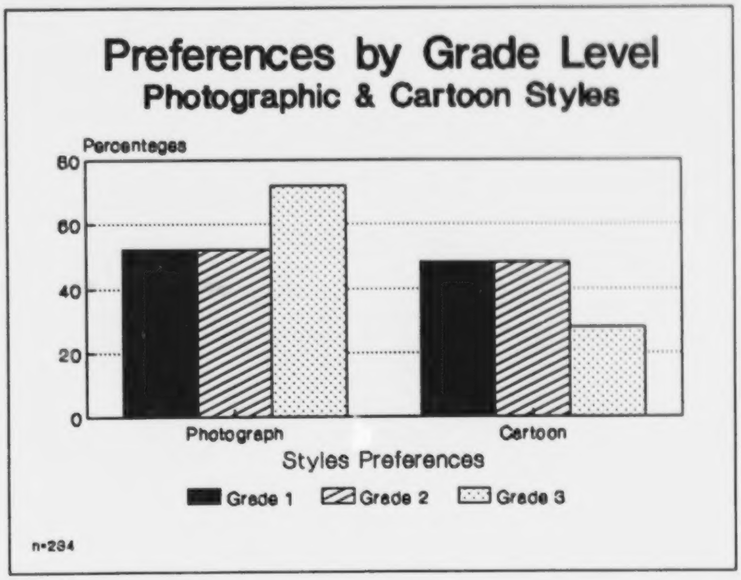
(5) The mood. This category included statements which dealt with mood of the subject depicted, such as, "He looks happy."

(6) Color. This category included statements related to color, such as, "Because it has more colors."

(7) Other. Included in this category were miscellaneous statements, which did not fall into previous categories.

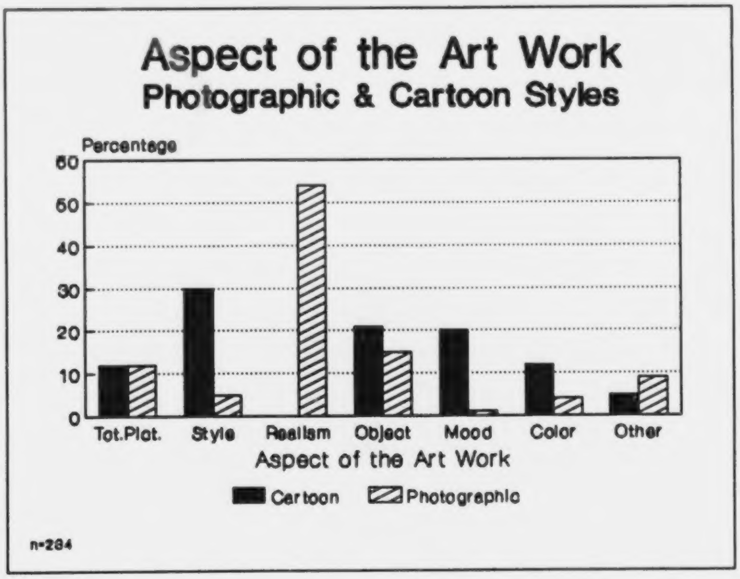
Analysis of research results indicated that first, second, and third grade children preferred the photographic style (52%) and cartoon style (37%). See Figure 1. Third graders exhibited an increasing preference for the photograph. These results supported the research conclusions of the previous study (Ramsey, 1982).

Figure 1.



Application of the classification model to children's verbal responses indicated differences in the types of verbal responses for those children who preferred the cartoon and for those who preferred the photograph. See Figure 2.

Figure 2.

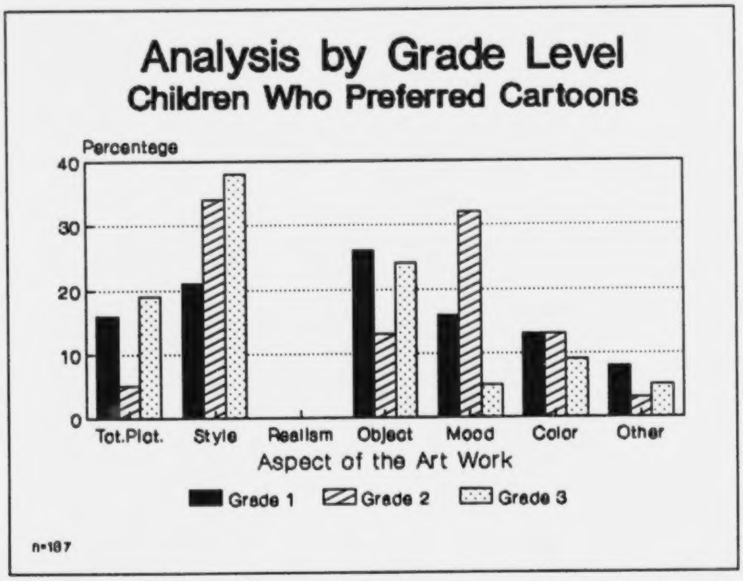


For those children who preferred the cartoon, the majority of responses fell into the categories of style ("I like cartoons."), object depicted ("I like his big pink ears and his big pink nose."), and mood ("He looks happy."). Analysis of the responses under object depicted and mood indicated that these responses were related to the exaggerated elements indicative of the cartoon style and aspects of personification in the pictures. Elementary children, who preferred the cartoon, recognized the cartoon style specifically or reacted to elements associated with exaggeration/personification within that style.

For those children who preferred the photograph, 54% of the children stated, "I like it because it is real." See Figure 2. No child who preferred the cartoon style made this type of statement. Rounding out responses in this category were statements related to style ("It's like the pictures my mother takes."), object depicted ("I have a rabbit."), or color ("It has more color.") Again, these responses were related to the realism of the photographic style. This result supported previous research, which indicated that realism was an important factor influencing children's style preferences.

Analysis by grade level for children who preferred cartoons shows an increasing ability by grade level to identify by name the cartoon style. See Figure 3.

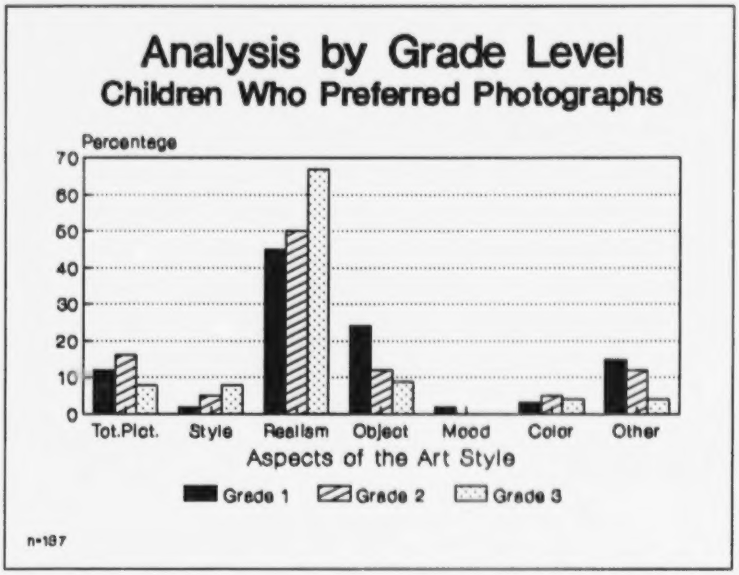
Figure 3.



Second graders made more mood statements than children at other grade levels while making fewer responses related to total picture and object depicted. The personification of the cartoon character seemed to attract second graders more than first and third graders. Responses of first graders were more varied than at other grade levels. These results suggest that children become more sophisticated in their ability to identify those factors which appeal to them in the illustrations.

Analysis by grade level for those children who preferred photographs also supports the conclusion of increasing sophistication of children by grade level to discriminate those factors which influence their style preferences. See Figure 4. Statements identifying realism increase with grade level.

Figure 4.



CONCLUSION

The study supports the conclusion that realism was the primary factor influencing primary age children's picture preferences for those children who preferred the photograph. That many children preferred cartoon style reinforces the commonly held assumption that primary age children like cartoons. Developmental studies have shown an increasing preference for reality based reading materials as children mature; that is, a developmental trend towards preference for realism should be expected. The great appeal of the realistic photographic style at all grade levels may be more surprising to educators.

Study results do support what children asserted in a previous study; that is, they equate photographs with depictions of reality, while they associate cartoon style with "pretend" situations. This is consistent with the results of those studies which investigated children's preferences for artistic styles to accompany specific literary forms. They preferred photographs or realistic art with biography (real), poem (content unknown), and informational text (real). They preferred cartoons with fanciful animal stories which featured personified animals (pretend). They also preferred more abstract styles with the literary forms, legend and narrative passage. This research suggests a complex interaction between children's perceptions of artistic style and their selection of style to accompany specific literary forms. This researcher suggests that results of this study support the conclusion that children employ artistic style as a yardstick for measuring the reality or fantasy of accompanying content material.

Primary age children's preferences for photographic style implies also a preference for reality-based reading materials illustrated in full-color photographs. Few books on an easy reading level are available to meet these children's interests. Library media specialists and teachers are encouraged to seek out quality literature in easy reader format for the primary age group. This researcher encourages library media specialists to develop good nonfiction "Easy" collections to supplement the standard fare of personified animal books so prevalent in current "Easy" collections. In Virginia, library media specialists who have developed such collections report very positive results in meeting the reading interests of their students. Publishers should also be encouraged to produce more nonfiction books featuring full-color photographs for this age group.

In addition, producers of both print and nonprint materials for children should evaluate their employment of artistic styles in picture content in terms of the instructional message the children will receive. The current practice of using cartoon style indiscriminately to illustrate visuals, because, "Kids like cartoons," should be examined. Obviously, further research in this area is recommended.

REFERENCES AND BIBLIOGRAPHY

Amsden, R. (1960). "Children's Preferences in Picture Story Book Variables." *Journal of Educational Research*, 53, 309-312.

Bou, I. and Lopez, D. (1953). "Preferences in Colors and Illustrations of Elementary School Children of Puerto Rico." *Journal of Educational Psychology*, 44, 490-96.

Clegg. L. (1968). "An Analysis of the Picture Illustration Preferences of Primary Grade Children." *Dissertation Abstracts*.

Lam, C. (1966). "Pupil Preference for Four Art Styles Used in Primary Reading Textbooks." *Grade Teacher*, 83, 137-143.

Lucas, D. (1977). "Fifth-Grade Children's Preferences for Illustrations in Middle Grade Basal Reading Materials." *Dissertation Abstracts*, 38, 3270-3271.

Matchotka, P. (1966). "Aesthetic Criteria in Childhood: Justifications of Preferences." *Child Development*, 37, 877-885.

Mayer, R. (1969). *A Dictionary of Art Terms and Techniques*. New York: Crowell.

Mellinger, B. (1932). *Children's Interests in Pictures*. New York: Teachers College, Columbia University.

Miller, W. (1936). "The Picture Choices of Primary-Grade Children." *Elementary School Journal*, 37, 273-281.

Moore, B. (1973). "A Description of Children's Verbal Responses to Works of Art in Selected Grades One Through Twelve." *Studies in Art Education*, 14, 27-34.

Myatt, B. and Carter, J. (1979). "Picture Preferences of Children and Young Adults." *Educational Communication and Technology*, 27, 45-53.

Ramsey, I. (1982). "The Influence of Styles, Text Content, and Sex on Children's Styles Preferences." *Journal of Educational Research*, 75, 237-240.

Ramsey, I. (1989). *Journal of Educational Research*. In process.

Rudisell, M. (1952). "Children's Preferences for Color Versus Other Qualities in Illustrations." *Elementary School Journal*, 52, 444-451.

Rump, E. and Southgate, V. (1967). "Variables Affecting Aesthetic Appreciation in Relation to Age." *British*

Journal of Educational Psychology, 37, 58-72.

Sloan, M. (1971). Picture Preferences of Elementary School Children and Teachers. Ann Arbor, Mich.: University Microfilms.

Smith, K. (1960). "The Scientific Principles of Textbook Design and Illustration." AVCR, 8, 29.

Stewig, J. (1974). "Children's Picture Preferences." Elementary English, 51, 1012, 1013.

THE DELPHI STUDY: A PROPOSED METHOD FOR RESOLVING VISUAL LITERACY UNCERTAINTIES

Judy Clark Baca
Roberts A. Braden

The literature on visual literacy includes a variety of viewpoints and opinions held by the people involved in the field. Each person who has written on the topic of visual literacy has done so from the perspective of his or her own background and professional concerns. These concerns are reflected in the relative emphasis placed on different aspects of visual literacy. This has created an apparent lack of agreement as to what the components of visual literacy are and how critical an element each construct is. The result has been the lack of a comprehensive description of the field of visual literacy and of the related elements and constructs which underlie it.

This paper presents a report of research in progress. The report will be limited to a discussion of the need for and background of the study and of the research design. In particular, this paper will propose the Delphi technique as the most viable and suitable method for resolving visual literacy uncertainties. The first phase of the research project was undertaken to address two issues: 1) what are the concepts and constructs which comprise the elements of visual literacy, and 2) how much agreement or disagreement exists concerning those elements?

At the outset of the current project the authors proposed that the methodology most appropriate for answering these questions would be the Delphi technique. That research method frequently has been applied to clarify situations in which there was little apparent concensus. Originally the purpose of Delphi studies was for futures forcasting or for narrowing the range of a set of estimates. More recently the procedure has been applied to policy making and to narrowing gaps in opinion. Therefore, the authors speculated that the procedure would also be suitable for the task of identifying the constructs of visual literacy.

Lack of Accepted Definitions

Exactly what is visual literacy? This is a question which has plagued those who are concerned with the field for years. Since the first conference on visual literacy was held in 1969, there has been much discussion and no small amount of disagreement concerning this question. At that time, John Debes wrote that "When I say 'visual literacy,' what I have in mind is a great dim shape, the outlines of which and the importance of which are not yet clear" (1970, p. 1).

Debes agreed to write the first definition of visual literacy with the caveat that the definition was tentative and "sure to be changed" (Debes, 1970, p. 14). Since then, the definitions of visual literacy have varied from including only a narrow range to a very broad range of elements. Some writers and practitioners have addressed only understanding visuals, others have included understanding and creating visuals, while others have included a much broader range of abilities. Hortin, for instance, stated that visual literacy includes the abilities required to "learn, understand, think, communicate and store information in one's mind visually" (1980, p. 21). In a definition deliberatly structured to incorporate the essentials of visual thinking, visual learning, and visual language, Hortin and Braden offered this definition: "Visual literacy is the ability to understand and use images, including the ability to think, learn, and express oneself in terms of images" (1982, p. 169). Significantly, even that definition fails to directly address design, creativity, and aesthetics as they apply to visualization.

The literature on visual literacy includes much which is little more than statements of personal opinion or philosophy and reports on programs and visual literacy projects (Hocking 1978). This literature included essays by both theorists and practitioners in various academic content areas. Some of these writers embraced the concept of visual literacy; others rejected it either in its entirety or, at the least, its usefulness when applied to a particular academic discipline.

Sinatra claimed that visual literacy is prerequisite to human thinking and to the development of other literacies. He stated that "...media and artistic literacies have a direct interactive relationship with a visual literacy base. This base is composed of the processes of viewing, sensorimotor exploration, and nonverbal representation which are housed in schemata or mental images" (1986, p. 58).

Other writers reported great benefits when visual literacy concepts and practices were utilized in their content areas. However, the nature of the measures and reports (frequently self-evaluation or teacher observation) was usually rather subjective (Hocking, 1978).

Other authors asserted that visual literacy is not a viable concept and made an issue of rejecting it entirely. Suhor and Little suggested that visual literacy is "...not a coherent area of study but, at best, an ingenious orchestration of ideas" (1988, p. 470). Cassidy and Knowlton labelled visual literacy a "failed metaphor" and offered the proposition that "Visual Literacy (VL)--as a metaphor, as a concept, and as a movement--is a paradox. ...in the sense of inherently contradictory". They asked "What is VL, or, by the criterion of a profitable science and technology, what might it become if it is to serve as an abundant generator of questions, hence a guide to fruitful research?" (1983, p. 67).

The aspects of visual literacy which are most frequently criticized include its theoretical foundations and the research which has been conducted in the field. Many of the authors who have addressed the theoretical foundations of visual literacy have asserted that the basis for the concept of visual literacy has been derived by borrowing from a diversity of fields, including education, philosophy, perception, art theory, linguistics, and human developmental theory (Debes, 1970; Hocking, 1978; Hortin, 1980). In addition to basing visual literacy upon the theory of other disciplines, visual literacy has been supported by research in other disciplines.

Hocking (1978) addressed the paucity of experimental research in the field in the following statement:

> Much of the literature available fell within the realm of hypothesizing and undocumented personal opinion. ...Some research has been background research concerning the rationale behind Visual Literacy; and much of the field research has been without the tight control of experimental design. ...the tremendous amount of information published on a topic that crosses so many fields and disciplines prevents any hope of exhaustiveness... (pp. 10-11).

A comprehensive description of the components of visual literacy and of the ideas related to it might provide some structure for research that would validate the field. Hocking stated that "The enumeration of the skills of Visual Literacy help define the discipline" (p. 13). Spitzer and McNerny called for an operational definition of visual literacy, claiming that without one "...the nature of the construct is speculative, ambiguous, and too prone to misinterpretation" (1975, p. 31). Cassidy and

Knowlton called for a description of visual literacy which could provide direction for future research. They stated that "...if from the VL arena someone would step forward and offer conceptual and operational definitions of VL (no matter how incomplete and tentative), honest-to-goodness research work could begin" (1983, p 84).

Attempts to organize the array of concepts and topics which are related to visual literacy have been made. Braden (1987) identified three "domains" of visual literacy: visualization, described as "aspects of vision in the human processes of thinking and communication" (p.7); the "theory-research-practice trilogy"; and technology, including the effects of technological developments upon the other two domains of visual literacy. Within these three domains, he organized many of the components and areas of concern which have been addressed in the literature. Among these components were visual thinking, visual design, visual syntax, visual expression, critical viewing skills, visual verbal interaction (from the visualization domain); instruction, design, communication, persuasion, visual verbal interaction (from the theory-research-practice domain); and electronics, television, reprographics and computers (from the technology domain).

However, Braden's attempt at categorization was theoretical, tentative, and far from comprehensive. Consequently, the current research in progress was begun as a further effort to provide a description of the components of visual literacy. Because the task clearly involved integrating diverse opinions, a consensus-building approach was deemed desirable. The Delphi technique, which was designed to deal with diversity and opinions ranging from negative to positive, emerged as the procedure most likely to achieve the desired goal -- consensus on the basic visual literacy constructs.

The Delphi Technique

The Delphi technique is a research method which is used to elicit the input of a group of individuals and to pool their collective knowledge in an attempt to formulate a group judgment or statement of opinion. The Delphi technique was used by the Rand Corporation in studies they conducted for the Department of Defense. At that time, the Rand Corporation conducted extensive tests to validate the methodology and reported these tests in a series of reports (Dalkey, 1969; Brown, Cochran & Dalkey, 1969; Dalkey, Brown & Cochran, 1969; Dalkey, Brown & Cochran, 1970).

The validation studies performed by the Rand Corporation utilized "almanac type" (factual) questions with identifiable "correct" (quantitative) answers. The studies showed that, with reiteration, the group estimate (identified as the median of the responses) became more accurate. Further, the diversity of answers narrowed toward a greater degree of consensus or agreement (Dalkey, 1969, p. 20).

The Delphi technique is commonly applied in situations in which there exists knowledgeable opinion rather than specific correct answers. The assumption is that if group responses move towards an identified correct answer, they also move toward an unidentified but still correct opinion. Furthermore, involvement in the process narrows the range of opinion and leads to agreement concerning a statement of opinion formulated in this manner. Finally, the interquartile range provides a definite measure of the degree of such consensus.

The Delphi technique has been applied in fields such as management, education, and medicine. It is used as a decision making process in formulating policy statements, in forecasting future developments of technologies and their applications, in risk assessment, and in curriculum development. The Delphi technique is particularly useful when an attempt is being made to achieve one of the following purposes:

> ...(a) determining or developing a range of possible alternatives, (b) exploring or exposing underlying assumptions or information leading to various judgments, (c) seeking out information that may generate a consensus on the part of the group involved, or (d) correlating informed judgments on topics spanning several disciplines (Harrison, 1987, p. 278).

The technique elicits the opinions of a group of knowledgeable persons and then seeks to identify one group opinion based on that input. Other techniques, such as face-to-face discussion, are used toward the same goal of formulating a statement of group opinion. IVLA 2000 has been one such attempt to formulate a group statement of the goals of IVLA. Such group discussions, however, frequently break down under the pressures and the dynamics of group interaction. The Delphi technique has several advantages:

1) The anonymity provided by using questionnaires rather than face-to-face interaction minimizes the possible biasing effects of a dominant individual in group interaction.

2) The results are reported in the form of one opinion based on the group response rather than as a group of individual opinions.

3) Statements derived through a Delphi process are generally better accepted by the persons involved than are those derived through more direct forms of interaction (Dalkey, 1969, p. 17).

To gain maximum benefit from the Delphi technique, events must occur in the optimum order. Thus, the following sequence is appropriate to the conduct of a Delphi study:

1) A group of knowledgeable persons (experts) are identified and asked to participate in the study.

2) Individual opinions are elicited from the participants.

3) These opinions are put into written form so that each individual may respond to them by agreeing or disagreeing with the statements.

4) A series of "rounds" or iterations are performed in which the participants use a Likert scale to rate each item on the instrument (list of statements). Following each iteration, a statistical summary of the group's response is calculated. This summary is fed back to the participants on the following iteration, or "round", of the Delphi study.

5) In each succeeding round, participants are asked to consider information from the statistical summary of the previous round and to re-rate each item.

Application of the Delphi Technique to Visual Literacy

In the study reported here, the Delphi technique was employed in an attempt to develop a comprehensive description of visual literacy. The description of this study will provide an example of the application of the steps involved in a Delphi study.

Selection of the Delphi Participants

The Delphi technique is a method for pooling the opinions of a group of experts. Therefore, the selection of subjects who would participate in this study involved the identification of a group of persons who are knowledgeable enough about visual literacy to be considered "experts". This selection was accomplished in the following manner. A list of names was compiled which included all the people who had published one or more articles in JVVL in the previous five years, the people who had published in the readings from IVLA's Annual Conference between 1984 and 1988, and the participants of the Symposium of the International Visual Literacy Association which was held in Stockholm, Sweden in 1987. This list, which included two hundred seventeen names, was sent to the eight members of the 1988 Executive Board of the International Visual Literacy Association. Each member was asked to select from the list and to add other names in order to identify thirty persons whom they felt were knowledgeable about visual literacy or had made significant contributions to the field and could be considered "experts". A total of eighty-eight people were selected at least once and were thus considered to have been identified as having a degree of expertise adequate to be asked to participate in the Delphi study.

An invitation to participate in the Delphi study was sent to each of the eighty-eight people identified in this manner. The letter of invitation included information about the Delphi technique and emphasized that a Delphi study is a long process for both the researcher and the participants. The recipients of this letter were asked whether or not they were able and willing to commit the time which would be required to complete the study. Of the eighty-eight invitations which were sent, seventy-three responses were received; fifty-nine of those responses were from people who agreed to participate in the study.

Round One

Development of the Delphi form. A review of the literature was conducted to identify as many aspects of visual literacy as possible. Based upon this literature review, twenty-six broad questions were formulated. These questions were to be used as stimuli for the respondents' statements of opinion regarding visual literacy constructs. A final question was added which asked the participants to identify other areas of concern and not to limit their responses to those stimulated by the questions. This final question and the unstructured format for the responses were incorporated in order to take this study beyond the limits of the existing literature and to benefit fully from the depth and breadth of knowledge represented by the Delphi participants.

The participants were asked to respond to the questions with written answers. This diverges somewhat from the procedure usually employed in a Delphi study. It is more common for the researcher to formulate a tentative list of statements, thus making analysis of the responses much more manageable. In this case, providing such a list might have limited the ideas and constructs addressed by the participants and was, therefore, judged not to be congruent with the goal of providing a comprehensive description of visual literacy. However, since the responses were to be written by each participant, asking each participant to respond to twenty-seven questions would have made unreasonable demands on their time. Therefore, the questions were divided and six sub-forms were created, each of which contained seven questions. Of those seven questions, five were asked of only some of the participants, while the following two (the broadest questions) were on each sub-form and were asked of each participant:

> Provide a definition of visual literacy which is acceptable to you. It may be your own, someone else's, or one which you have modified. Some elements you may wish to include are: abilities to..... with (elements)..... for (purposes)..... using (tools).....
>
> What other concerns, opinions, questions etc. regarding the nature and/or the limits of visual literacy would you like to see addressed in this study? You might consider things I have left out in regard to a definition of the term, visual literacy as a field, visual language, the practice of visual literacy, educational implications, and visual literacy research.

Administration of the questionnaire. Each participant was sent the master list of twenty-seven questions and a shorter form with seven questions. They were asked to answer all the questions on their short form and as many from the master list as their time and interest allowed. The final question asked each participant to examine the master list in order to identify aspects of visual literacy which were not already being adequately addressed. In addition, a list of terms which might serve as stimuli was included. This list included as many terms as could be identified in the literature related to visual literacy. Round One of the Delphi study thus consisted of a master list of twenty-seven questions, one of six short forms which each included seven questions, a list of terms, and a cover letter. This was sent to the fifty-nine participants in May, 1989.

The response was overwhelming! Fifty-one responses were received. Several of the respondents answered all of the questions on the long list at some length. Others discussed the questions on the short form and either provided brief responses to all or most of the others or discussed a few of them at length. It was apparent at this time that the participants were a very motivated, committed group, and concerns about attrition rate and about ending the study with an adequate number of participants were considerably alleviated.

Round Two

Development of the form. The responses to Round One were analyzed in order to identify each area of concern and the individual elements which were mentioned in relation to those areas. These elements were arranged into categories and subcategories.

A form was created which included broad areas (constructs) and as many supporting details as could be organized into that framework. The result was the form for Round Two, which included 186 statements or partial statements. On this round and on each successive iteration, the Delphi participants were asked to rate each statement (or portion of a statement) on a scale of 1 to 4, indicating the extent to which they agreed that it identified or elaborated upon an element of visual literacy. The respondents were asked to use the following values for the scaled responses. A response of "4" indicated strong agreement ("agree strongly"), "3" indicated mild agreement ("agree somewhat"), "2" indicated mild disagreement ("disagree somewhat"), and "1" indicated strong disagreement ("disagree strongly").

Analysis of the responses. Fifty-two of the fifty-four Round Two forms were completed and returned. The responses to Round Two were analyzed by combining the responses to each item and computing the interquartile range, the median, and the mean for each. The median, of course, is that response above which 50% of the respondents answered and below which 50% of the respondents answered. The first quartile (Q_1) is the point below which 25% of the respondents answered. The third quartile (Q_3) is the point above which 25% of the respondents answered. Including the median and the first and third quartiles on the next round of the study gives the participants information which includes a measure of central tendency (the median) and the range of answers selected by the central fifty percent of the group (from Q_1 to Q_3).

Round Three and Beyond

Further iterations of the Delphi consist of giving the participants a summary of the group's responses to those statements and the opportunity to reconsider their positions in light of that information. These iterations may be continued until there is no longer a significant narrowing of the range of responses. A concise summary of the Delphi technique and the subject of concluding such a study is provided in the following statement.

> The delphi technique provides for the systematic solicitation and collation of judgments on a particular topic through a set of carefully designed sequential

questionnaires interspersed with summarized information and opinions derived from earlier responses. Usually only two repetitions of questionnaires and feedback reports are used to obtain a final opinion from the group" (Harrison, 1987, p. 279).

Examining the Results of the Delphi Study

When the final round of the Delphi study has been administered and statistically analyzed, there will be information on two things: 1) the degree of consensus, and 2) the level of acceptance for each item.

The interquartile range provides a measure of the degree of consensus on an item. The interquartile range is figured by subtracting Q_1 from Q_3, thus identifying the range of responses among the central 50% of respondents. The smaller the interquartile range, the greater the degree of consensus. The larger the interquartile range, the less the degree of consensus. The interquartile range on the final round will be used as a measure of the degree of consensus concerning whether each item identifies a construct of visual literacy. The items may then either be ranked by degree of consensus or arranged into groups by degree of consensus.

The level of acceptance will be used to determine the inclusion or exclusion of an item in the final list of constructs which define the field of visual literacy. The level of acceptance for each item is the measurement of group rating of an item; either the median or the mean for each item may be used. A level at which each item is accepted as a construct of visual literacy has been established for this study. An item meeting or exceeding that level will be accepted as a construct of visual literacy. An item which falls below that level will be rejected as a construct of visual literacy. In this study, an item must achieve a mean of at least 3.0 on the final round of the Delphi study to be accepted; any items with a lower mean will be considered to have been rejected by the Delphi panel.

The level of acceptance and the degree of consensus are independent of one another. It is possible, for instance, for there to be an extremely high degree of consensus (interquartile range of .5) regarding an item which is rated low enough to be rejected (less than 2.99).

Final Phase of the Research Project

After the Delphi study has been completed, this research project will include another phase. In this final phase, a larger group of professionals who are interested in and involved in visual literacy will be asked to use the same list of statements to rate the relative importance of each. The entire membership of IVLA will be asked to participate in this phase. This will elicit the input of most of the people who have expressed an interest in visual literacy through affiliation with that organization and provide a view of the field as perceived by the professionals involved in it. The responses will be statistically compared to those on the final round of the Delphi study to determine whether or not the final phase, using a larger group of knowledgeable professionals, confirms the results of the Delphi study. Further, this phase of the project will provide a measure of the importance of the constructs which were identified in the Delphi study.

References

Braden, R. A. (1987, June). *High impact technology and visual literacy: Reacting to change*. Paper presented at the Symposium on Verbo-Visual Literacy, Stockholm, Sweden.

Braden, R. A. and Hortin J. A. (1982) Identifying the theoretical foundations of visual literacy. In R. A. Braden and A. D. Walker (Eds.) *Television and visual literacy*. Bloomington, IN: International Visual Literacy Association.

Brown, B., Cochran, S, & Dalkey, N. C. (1969). *The delphi method, II: Structure of experiments*. Santa Monica, CA: The Rand Corporation.

Cassidy, M. F. & Knowlton, J. Q. (1983). "Visual literacy: A Failed Metaphor?" *ECTJ*, *31* (2), 67-90.

Dalkey, N. C., Brown, B., & Cochran, S. (1969). *The delphi method, III: Use of self-ratings to improve group estimates*. Santa Monica, CA: The Rand Corporation.

Dalkey, N. C., Brown, B., & Cochran, S. (1970). *The delphi method, IV: Effect of percentile feedback and feed-in of relevant facts*. Santa Monica, CA: The Rand Corporation.

Dalkey, N. C. (1969). *The delphi method: An experimental study of group opinion*. Santa Monica, CA: The Rand Corporation.

Debes, J. L. (1970). The loom of visual literacy -- an overview. In C. M. Williams and J. L. Debes (Eds.), *Proceedings: First national conference on visual literacy*. New York: Pitman Publishing Corporation.

Harrison, F. (1987). *The managerial decision-making process* (3rd ed.). Boston: Houghton Mifflin:

Hocking, F. O. (1978). A nationwide survey to determine visual literacy goals, constraints, and factors influencing their selection (Doctoral dissertation, University of Colorado, 1978). *Dissertation Abstracts International*, 1978, *39*, 2699A. (University Microfilm No. 78-20520)

Hortin, J. A. (1980). *Visual literacy--the theoretical foundations: An investigation of the research, practices and theories*. (Doctoral dissertation, Northern Illinois University, 1980).

Sinatra, R. (1986). *Visual literacy connections to thinking, reading and writing*. Springfield, IL: Charles C. Thomas.

Spitzer, D. R. & McNerny, T. O. (1975). Operationally defining "visual literacy." A research challenge. *Audiovisual Instruction*, (10), 30-31.

Suhor, C. & Little, D. (1988). Visual literacy and print literacy -- theoretical considerations and points of contact. *Reading psychology*, *9* (4), 469-482.

MEDIA LITERACY EDUCATION NEEDS FOR ELEMENTARY SCHOOLS : A SURVEY

Donna Lloyd-Kolkin
Kathleen Tyner

In May 1988, Strategies for Media Literacy (SML) surveyed teachers in public and parochial elementary schools in San Francisco, CA to ascertain their perceptions of media use by students, their use of media in the classroom, and what they thought it was important for students to understand about media.

The survey, funded by the L.J. and Mary C. Skaggs Foundation, is considered the first step in the design and development of a media literacy curriculum for students in grades one to six. By better understanding how teachers currently use media and how they would like to use it, Strategies for Media Literacy believes it can build on current practices and focus curriculum design in ways that would enhance adoption of the curriculum by classroom teachers and curriculum decision-makers.

METHODOLOGY

Data Collection

A mail survey of public and parochial school teachers was undertaken in May 1988 by Strategies for Media Literacy. Enough copies of the survey form were mailed to principals at each of 70 schools in the Archdiocese of San Francisco with a request that they be distributed to all teachers in the school. Ten copies were mailed to principals at each of 70 elementary schools in the San Francisco Unified School District with a request that they be distributed to the five teachers whom the principal considered "most likely to respond."

The survey form was designed as a stamped self-mailer and teachers were asked to mail it back to SML after they completed the instrument. As an incentive to respond, SML offered a complimentary issue of the SML newsletter to teachers who responded. Teachers were also able to place their name on the SML mailing list for an ongoing free subscription.

One follow-up mailing was sent to principals at 30 schools in the Archdiocese where response rates were lower than average.
Assuming principals followed the written survey instructions, a total sample of 1,140

teachers was surveyed. Of these, 790 were parochial school teachers and 350 were public school teachers.

A total of 373 questionnaires was returned to SML for a response rate of 33 percent.

Data Analysis

The survey instrument consisted primarily of closed-ended items. A few open-ended question were content-analyzed for typical responses and a coding structure developed for the range of responses uncovered.

The data was analyzed using the Statistical Package for the Social Sciences (SPSS). After examining the frequency distributions for each item, two new variables were created. The first classified teachers on a scale of media activity, i.e., the number of ways teachers addressed media in the classroom. Teachers were classified as active media users if they incorporated media into their classroom instruction in more than four ways, since four was the median number of ways teachers reported they used media. For example, an active media user might report she taught media as a formal subject in itself, through assignments using TV or radio, through spontaneous discussion of advertising, through discussion of general TV viewing, and through the use of technical equipment in the classroom. In contrast, a less active media user might report only one of those strategies.

Among teachers in the sample, 198 were considered media active, while 175 were counted as "less active."

The responses of active media users were compared with those of their less active peers on a number of key variables to examine differences between them. Such differences may help target the design of and integration with the rest of the curriculum, as well as dissemination of the media literacy curriculum materials to be developed.

In addition, responses of parochial and public school teachers on some items were compared. Whenever comparisons were made between parochial and public school teachers or between media active and less active teachers, a chi square test of significance was conducted. Where significance levels are reported in this report, they are based on the chi square statistic, unless otherwise noted.

THE SAMPLE

The sample consisted of 373 elementary school teachers. The typical respondent was a female (87.9% of the sample) who had been teaching for three to five years (52.3%). Equally likely to teach in a public (51.2%) or parochial school (48.8%), she most likely taught a class in first through fifth grade.

This respondent profile contrasts sharply with the average San Francisco Unified School District teacher who is 48 years old and has 18.7 years of service. The average length of service for teachers in the Archdiocese of San Francisco is estimated to be about ten years. Responding teachers are less experienced than average and, presuming age correlates with length of service, younger than average.

Table 1 shows the length of service profile of the sample, while Table 2 displays the distribution of grades taught by teachers in the sample.

TABLE 1
Years of Teaching Experience Among Sample Teachers
(N=373)

2 years or less	19.8%
3-5 years	52.3
6-10 years	27.9

Well over one-half (58.7%) of the elementary school teachers included in the survey taught in the primary grades of Kindergarten through the 3rd grade (Table 2).

TABLE 2
Distribution of Grades Taught by Elementary Teachers
(N=324)

Kindergarten	11.4%
1st	16.1
2nd	17.0
3rd	14.2
4th	13.9
5th	19.8
6th	7.7

RESULTS

The survey addressed three broad domains: perceived use of media by students, media use in the classroom, and perceived goals for media education.

Perceived Use of Media by Students

Questions within this domain addressed teachers' perceptions of their students' media use and competency. Questions included the frequency with which various media was used by students; judgments about the appropriateness of student time spent with the media; and teachers' evaluations of students' mastery of a number of media literacy competencies. For the study, media literacy was considered to have two components. One was competency in equipment use and the other was competency in understanding media, including the ability to regulate the amount of time spent in media, distinguishing fact from fiction in media content, etc.

Table 3 shows the mean ranking of each medium, as teachers perceived their use by students, where 1 means "most often used."

TABLE 3
Teacher Ranking of Student Media Use

	Mean Ranking
Television	1.20
Video/Computer Games	2.86
Movies	3.70
Radio	3.86
Records	4.25
Magazines	5.30
Newspapers	5.96

As seen in Table 3, the electronic media clearly dominate the print media. Television was clearly ranked as the medium used most often by students, with 88.7% of teachers ranking it tops with their students. Video and computer games were ranked second, with over one-half (52.5%) of the teachers ranking it first or second choice. Movies ranked third, with 50.3% of teachers ranking it first, second or third while radio ranked fourth, with 45.6% of teachers ranking it first, second or third choice. Fifth in popularity was records, with 58.4% of teachers ranking it third, fourth or fifth. Sixth was magazines, with 75.9% ranking it fifth, sixth or seventh, while newspapers ranked last with 82.4% ranking it fifth, sixth or seventh.

Over two-thirds of the sample (68.9%) believed that students spent too much time with the media. One in five (18.6%) thought just the right amount was spent, while one in eight (12.5%) thought not enough time was spent by students using media. Table 4 displays these findings.

TABLE 4
Teacher Perception of Student Time Spent in Media Use
(N=344)

Too Much	68.9%
Right Amount	18.6
Not Enough	12.5

The instrument did not allow teachers to specify which media they would like students to spend more or less time with, nor which functions of the media could use more time by students (e.g., news). Instead, it addressed only the total amount of time spent.

Parochial school teachers (92%) were more likely than public school teachers (83.3%) to say students spent too much or just the right amount of time. More public school teachers (16.7%) than parochial school teachers (7.9%) were likely to say students spent too little time with the media. These differences, shown in Table 5, are statistically significant.

TABLE 5
Parochial/Public Teachers Compared on Amount of Student Media Use

	Parochial (N=164)	Public (N=180)
Too Much	70.7%	67.2%
Right Amount	21.3	16.1
Not Enough	7.9	16.7

p = .0358

Teachers in the sample ranked students as quite competent in operating media equipment such as television, radios, record players, etc., but rather less competent in media understanding skills such as analyzing program values or distinguishing program content from ads. Tables 6 and 7 show the mean competency ratings for a number of media-related skills on a scale where 1 is highly competent, 2 is somewhat competent, 3 is slightly competent, and 4 is not competent.

TABLE 6
Mean Rankings of Student Media Equipment Competencies

Using Equipment	Mean Ranking:
Using TV	1.38
Using Radio	1.57
Using Tape Recorder	1.68
Using Record Player	1.73
Using VCR	2.15

TABLE 7
Mean Rankings of Student Media Understanding Competencies

	Mean Ranking:
Distinguishing Contents & Ads	2.55
Distinguishing Content & Reality	2.63
Identifying Values	2.86
Choosing Media Content	3.03
Analyzing Program Values	3.05
Limiting Media Use	3.34
Creating Media Content	3.40

Thus, while teachers rated students as "somewhat" to "highly competent" in using media equipment (Table 6), they rated students as only "somewhat competent" to "incompetent" in understanding the media. Students were judged more competent in

TABLE 8
Parochial/Public Teachers' Ratings of Student Media Understanding Competencies

	Highly Comp.		Somewhat Comp.		Slightly Comp.		Not Comp.		Signif.
	Paroch.	Public	Paroch.	Public	Paroch.	Public	Paroch.	Public	
Choosing Media Content	1.8	.5	29.2	15.9	52.6	45.6	16.4	37.9	.000
Creating Media Content	2.4	.6	15.2	5.1	41.2	30.3	41.2	64.0	.000
Limiting Media Use	.6	0.0	15.7	7.8	47.1	37.2	36.6	55.0	.003
Analyzing Pgm Values	2.9	.6	29.8	15.6	48.5	41.7	18.7	42.2	.000
Content vs. Reality	10.5	3.3	40.4	36.7	41.5	37.2	7.6	22.8	.000
Content vs. Ads	15.2	7.8	43.3	28.9	34.5	42.8	7.0	20.6	.000
Identifying Values	7.6	2.2	40.4	14.4	40.4	50.0	11.7	33.3	.000

TABLE 9
Teacher Evaluations of Student Media Understanding Competencies by Grade

	Highly Comp		Somewhat Comp.		Slightly Comp.		Not Comp.		Signif.
	K-3	4-6	K-3	4-6	K-3	4-6	K-3	4-6	
Choosing Media Content	1.7	0.0	11.4	31.1	44.9	53.8	42.0	15.2	.0000
Creating Media Content	1.2	0.8	6.4	12.5	28.3	43.0	64.2	43.8	.0082
Limiting Media Use	0.0	0.0	8.6	12.3	33.1	52.3	58.3	35.4	.0006
Analyzing Program Values	0.6	1.5	11.0	31.8	44.2	46.2	44.2	20.5	.0000
Content vs. Reality	1.7	9.2	35.6	41.5	37.9	41.5	24.7	7.7	.0000
Content vs. Ads	8.7	11.3	20.2	48.1	46.8	35.3	24.3	5.3	.0000
Identifying Values	1.2	6.1	15.6	36.4	50.3	41.7	32.9	15.9	.0000

distinguishing program content from ads and in treating dramatic program content as fictional than they were in limiting media use or in creating media content for themselves.

Teachers in parochial schools consistently judged their students to be more competent in media understanding skills than did public school teachers, as seen in Table 8.

Similarly, there were significant differences in teachers' evaluations of students' media understanding competencies by student grade level. Students in the primary grades (K-3) were judged to be considerably less competent than students in the intermediate grades (4-6). These results are shown in Table 9.

Media Use in the Classroom

Teachers were asked how they addressed students' media use in the classroom, how they would prefer to address it, barriers to incorporating media education into existing classroom practices, media equipment availability and frequency with which media equipment is used. This section reports the results of these items.

TABLE 10

How Teacher Address Media in the Classroom

As Part of Another Subject	66.2%
Through Spontaneous Discussion	56.6
Using Newspapers/Magazines	54.2
Using Technical Equipment	51.5
Discussing General TV Viewing	43.4
Using Television or Radio	38.3
Discuss Role of Advertising	37.5
Discuss Role of Mass Media	26.3
As a Formal Subject	12.9
Do Not Address Media	6.2

At the present time, only one in eight (12.9%) teachers in this sample teaches media studies as a formal subject in itself; almost two-thirds, however, (66.2%) teach about the media as part of another subject. Over one-half (56.6%) report that they find themselves teaching about media during spontaneous discussions with their students.

Teachers reported they were more likely to teach media using print media, such as newspapers and magazines (54.2%), than they were using television or radio (38.3%). Interestingly, over one-half (51.5%) addressed media through the use of technical equipment in the classroom.
The media topic most often discussed was general TV viewing (43.4%), followed by the role of advertising (37.5%) and the role of the mass media in society (26.3%). Only 6.2% of the teachers said they did not address media at all in their classrooms.

There were statistically significant differences between parochial and public school teachers in the media topics discussed and in how media lessons were taught. Parochial school teachers were twice as likely (35.2% compared to 17.8%) as public school teachers to discuss the role of the mass media in society with their students and considerably more likely (45.1% compared to 30.4%) to discuss the role of advertising. Further, parochial school teachers were far more likely (48.9% compared to 28.3%) to teach media through using television or radio than were public school teachers. Table 11 displays these comparisons.

TABLE 11
How Parochial/Public School Teachers Address Media in the Classroom

	Parochial	Public	Significance
Discuss Role of Mass Media	35.2%	17.8%	.000
Discuss Role of Advertising	45.1	30.4	.004
Assignments Using TV or Radio	48.9	28.3	.000

Moreover, when teachers are asked if they would prefer to address media use more or less often in their teaching, a resounding 86.6% said they would like to address it more often. Only 13.4% said they would address it less often.

Those teachers who would like to address media less often than they do now are most likely to say they have insufficient time (7.2%) than for any other reason. Table 12 displays these findings.

TABLE 12
Teachers' Reasons to Teach Media Less Often

Prefer to Teach More Often	86.6%
Prefer to Teach Less Often	13.4
Insufficient Time	7.2%
Lack Materials	2.7
Not Appropriate Topic	2.7
Feel Incompetent	.8
Children Too Young	.5
Low Priority	.3

Table 13 shows how teachers who would prefer to increase the frequency with which they address media in the classroom would prefer to do it.

TABLE 13
How Teachers Would Like to Address Media in the Classroom

As Part of Another Subject	65.3%
Using Newspapers/Magazines	59.6
Using TV/Radio	47.4
Through Spontaneous Discussion	46.0
Using Technical Equipment	40.3
Discuss Role of Advertising	30.1
Discuss General TV Viewing	28.5
Discuss Role of Mass Media	27.5
As a Formal Subject	22.9

Almost twice as many teachers (22.9% compared to 12.9% [Table 10]) would like to teach media as a formal subject than do currently do so. More than one out of every five teachers responding to the survey would like to incorporate media studies as a formal part of the curriculum.

Nearly two-thirds (65.3%) would like to incorporate media studies into their teaching on other subjects. Over one-half (59.6%) would like to use print media to teach about the media while almost one-half (47.4%) would like to use electronic media.

The most significant barriers for most teachers to incorporating more media education into their classroom activities are lack of time (64.6%), lack of teaching materials (47.2%), lack of equipment (26.8%) and lack of teacher training (20.4%) so teachers feel competent addressing media issues. Table 14 shows these findings.

TABLE 14
Perceived Barriers to Media Education

Lack of Time	64.6%
Lack of Materials	47.2
Lack of Equipment	26.8
Lack of Training	20.4
Admin. Objects	1.1
Parents Object	.8

When asked where they obtained media education resources, most teachers responded "Myself"--so it is no wonder that lack of time and materials are the single most important barriers to incorporating media education into the classroom. Other sources of materials include district media centers, newspaper agencies, librarians, textbook companies and community groups, as seen in Table 15.

TABLE 15
Sources of Media Education Materials

Myself	55.0%
Media Ctr	30.3
Newspaper	22.5
Librarian	20.4
Textbook Co.	19.3
Community Gr.	7.5

Lack of equipment was mentioned as a barrier to more media education by one out of every four teachers. When asked which technical equipment they had available, teachers indicated that technical equipment was fairly readily available; they most commonly had access to a videocassette recorder (VCR) (91.2%), television monitor (75.9%), overhead projector (75.3%), and personal computer (69.7%). Table 16 shows the distribution of media equipment available to teachers in this study.

TABLE 16
Availability of Media Equipment

VCR	91.2%
TV Monitor	75.9
Overhead Proj.	75.3
Pers. Computer	69.7
Slide Proj.	68.1
16mm. Proj.	59.2
Video Camera	36.2
Photo Lab	2.1

Teachers were asked how frequently they used media equipment, whether their use was almost daily, once a week, several times a month, monthly, rarely or never. Their responses were scaled from 1 (almost daily) to 6 (never) and a mean use score for each piece of equipment was obtained. Table 17 shows these results. The mean rankings of media equipment use show that personal computers were used most frequently by these teachers, average use being between once a week and several times a month. Next in frequency were audio recorders, TV monitors, newspapers, and VCRs, each used slightly more than once a month. Video cameras and photo labs were rarely used, reflecting their general unavailability to teachers in this sample (see Table 16).

TABLE 17
Frequency of Media Equipment Use

	Mean Ranking:
Pers. Computer	2.77
Audio Recorder	3.58
TV Monitor	3.72
Newspapers	3.75
VCR	3.82
Overhead Proj.	4.44
16mm. Proj.	4.87
Slide Proj.	4.90
Video Camera	5.37
Photo Lab	5.95

Media is addressed fairly widely by teachers in this study; about half address media in four or more ways and most use several pieces of media equipment on a frequent basis. Most often, however, direct education about media is not included in these classroom activities. Rather, media is used to support instruction in other subjects. The next section of this report considers what teachers believe it is important for students to understand about media.

Goals and Values for Media Education

Two questions in the survey addressed teachers' preferred goals for media education. The first asked what they thought the most important things for students to understand about media were, while the second asked how useful time spent with different media is to students' education.

The question regarding what is most important for students to understand about media was open-ended so that respondents could respond without an imposed set of choices. Their responses fell into eight broad categories:

> **A Window on the World:** Media is a learning tool and a source of information. As a supplement, it enriches the learning process. Media offers an opportunity to receive global information through indirect experience.
>
> **The Need for Critical Thinking:** Skills that are important include how to question content; to think about why content is presented in a particular way; to relate content to structure; methods to use ancillary sources of information to check and compare media presentations; how to recognize values embedded in media content and to distinguish between good and bad values encountered in media.

Content is Subjective: Media distorts content; some content is left out and some emphasized. Information is biased; opinion is presented as fact.

Self-Regulating Media Use: How to choose useful programming; how to use media as a supplementary activity; how to have an active rather than a passive experience and know the difference; choosing appropriate programming for age.

Telling Fact from Fiction: Telling fact from opinion, entertainment from news, real people and situations from stereotypes; an awareness that media imparts a sense of reality, but that its portrayals are not real.

How Media Works: How each medium works; how media work together; recognizing the manufactured components of media; knowing the names of production values; deconstructing the media into its basic elements; knowing how to use the media to produce content; the role of media in society.

Media Sells Products and Ideas: How to recognize the commercial influence; distinguishing ads from other content; separating the products from the emotional appeal of advertising; awareness of Madison Avenue tactics, public relations tactics and the image-making industries. Awareness that media delivers audiences/subscribers to advertisers.

Media Can Be Hypnotic: Electronic media is hypnotic and stunts learning and development. Media is addictive. An awareness that subliminal messages are sometimes embedded in content.

Up to two responses for each teacher were recorded.

Table 18 displays the distribution of responses from the sample regarding what they felt it was important for students to understand about the media.

TABLE 18
Important Things for Students to Understand about Media

Window on World	27.6%
Crit. Thinking	26.3
Subjective Content	20.4
Self-Regulation	16.1
Fact vs. Fiction	13.4
How Media Works	8.8
Advertising	2.9
Hypnotic Media	2.1

Teachers were most likely to mention the window on the world function of the media (27.6%), the need for critical thinking skills (26.3%) and the subjectivity of content of the media (20.4%) as important skills for students to learn. Generally, teachers were least likely to mention the possible hypnotic nature of the media (2.1%) or understanding advertising (2.9%) as important goals for media education to address. Since teachers perceive students as generally skilled at distinguishing ads from program content, this latter finding may not be surprising.

Public school teachers were significantly more likely than parochial school teachers to believe that important goals of media education were to understand the subjectivity of media content and how media works. Parochial school teachers were significantly more likely than public school teachers to stress the importance of teaching students to distinguish fact from fiction, as seen in Table 19.

TABLE 19
Goals for Media Education by Type of School

	Parochial	Public	Signif.
Window on the World	26.4%	28.8%	.6010
Crit. Thinking	26.9	25.7	.7808
Content Subjectivity	13.7	26.7	.0019
Self-Regulation	15.9	16.2	.9379
Fact vs. Fiction	17.0	9.9	.0447
How Media Works	5.5	12.0	.0260
Advertising	2.7	3.1	.8221
Hypnotic Media	2.7	1.6	.4330

Teachers who incorporate media into their classroom teaching in a number of ways (media actives) were significantly more likely than other teachers to emphasize the window on the world function, need for critical thinking skills, and how media works as important learning goals for students, as seen in Table 20.

TABLE 20
Goals for Media Education by Teachers' Media Activity

	Low	High	Signif.
Window on World	21.7%	32.8%	.0166
Crit. Thinking	20.0	31.8	.0097
Content Subjectivity	20.6	26.2	.9296
Self-Regulation	13.7	18.2	.2412
Fact vs. Fiction	13.1	13.6	.8890
How Media Works	4.0	13.1	.0019
Advertising	1.7	4.0	.1851
Hypnotic Media	2.3	2.0	.8598

When asked to respond to which media were most useful to their students' education, teachers were most enthusiastic about newspapers and VCRs, somewhat enthusiastic about magazines, and least enthusiastic about television and cinema. The mean rankings given each of these media is shown below in Table 21, where one is highly useful and 4 is harmful. Generally, teachers were positive in their ratings of these media. The least useful medium--film--was ranked somewhat useful while the others were each rated between highly useful and somewhat useful.

TABLE 21
Teaching Ratings of Media Usefulness to Education

	Mean Ranking:
Newspapers	1.60
VCRs	1.60
Magazines	1.66
Television	1.89
Cinema	2.16

Teachers regard media as important to their students' education. They are most likely to emphasize the educational importance of media in discussing what it is important for students to understand about it, along with the need for critical thinking skills and an understanding of the media's gatekeeping function.

DISCUSSION AND RECOMMENDATIONS

In years past, it was popular to portray teachers as disdainful toward and suspicious of mass media. Today, that picture appears to have changed. Teachers surveyed in this study revealed an open, enthusiastic and knowledgeable attitude toward mass media and a desire to incorporate media education into their classroom activities.

Findings from the study suggest the following guidelines for the development of media education materials:

1. Media education materials should be designed so that they may be stand-alone, but flexible enough that they may be incorporated into other subject areas. Information should be provided in the media curriculum about alternative content areas in which the materials might be usefully incorporated, in order to maximize the flexibility of potential use.

2. Media education materials developed should respond to perceived teacher needs and interests, yet not neglect key areas overlooked by teachers through possible lack of knowledge about media. For example, media education materials can be responsive to teacher interests by stressing the educational function of the media and critical thinking skills;

once having "hooked" the teacher with these emphases, they may also emphasize how media works, an area teachers may not deem important because they are not fully aware of what it means and how it influences the messages we receive.

3. Because there is wide access to certain pieces of media equipment, e.g. VCRs, television monitors and personal computers, an innovative media education curriculum should strive to be as multi-media as possible to broaden its appeal and students' experiential learning.

On the contrary, teachers generally lack easy access to photography labs and video cameras. Thus, student production activities might be included as optional activities rather than mandated ones.

4. Since lack of time and lack of materials are the two key barriers to more media education, media education materials should be designed to be as stand-alone and easy to use as possible. This suggests, for example, detailed teaching plans to minimize teacher preparation time.

5. Since teachers in primary grades (K-3) rate student media understanding competencies and goals differently than do teachers in intermediate grades (4-6), the curriculum content should be designed to correspond to developmental differences in media use and understandings among children as they mature.

6. Further study about media use and interests among teachers would be helpful. Topics for further study include how teachers value various ways in which students spend time with the media (e.g., news vs. entertainment); how teachers would like to use media in the classroom (e.g., the frequent use of personal computers may be largely for drill and practice, an instructional task which teachers may value but which other media may not accomplish as easily); and how middle school, junior high school and senior high school teachers would respond to the issues raised in this study.

Overall, there is a reasonable demand for media education materials and a clear lack of available materials presently on the market or known to teachers. Materials developed could be distributed through district media centers to interested teachers. Because there is a high interest among parochial school teachers in this study, special efforts to target parochial schools should be made in any dissemination and outreach efforts. Similarly, because the bulk of responding teachers have been in their positions for under five years, outreach efforts might focus on new teachers through pre-service and in-service training programs.

VISUALIZATION AND DEAFNESS: A REVIEW OF RESEARCH

Fatemah Olia

The subject of visualization is of special interest to those who are involved with deaf education. Somehow it is simply inferred that for deaf learners, educational programs should go through a visual path from the start to the end, or from the instructional mode of presentation to testing. It is also assumed that deaf learners are cognitively more visually oriented so they tend to encode information visually, store it in image form, and decode the information also in image form. This presentation will attempt to respond to some of the foregoing assumptions by giving a review of related literature during the past twenty five years. Furthermore, several specific categories of research will be identified and discussed, gaps in reseach related to this area will be determined, and at the conclusion, suggestions for future investigation will be made.

The subject of visualization, as old as it is, remains open for investigation. Mental images could be defined not only in form visual but also auditory and even kinesthetic in one's mind. In general, the studies on visualization as an instructional strategy fall into two types: (1) imposed imagery, in which learners are presented with visuals in some form such as pictures, films, slides; and (2) induced imagery, in which learners have to generate their mental images independent from any external counterpart. Both types of imagery conditions have proved to be effective in learning and especially in the retaining of verbal materials (Fleming, 1977, 1979; Pressley, 1977). During the past fifty years, from the advent of visual education to the present, the curiosity in the role of visualization in the instructional processes have left us with an abundant reseach. However in relation to deaf learners, the interest has been surprisingly limited. The lack of sufficient research in this area is astonishing especially since instruction, and in general communication, basically happens through a visual mode for this group of learners.

As one could assume, the major emphasis of reseach in this area concerns the use of visual media or imposed imagery in instruction. Several studies in the early 1970s, examined the effectiveness of videos, pictures, slides, and television in the teaching of deaf learners. In one study, Reynolds (1973) compared three printed instructional formats; narrative textbook, individualized materials, and pictorial display, among college students. Darding (1974) reported on a program developed to enhance the communication skills of the middle-school age children by using pictures. Newby (1974), reported on a project at the Pennsylvania school for the deaf, involving production of a collection of illustrations to define concrete concepts. The illustaions were to aid language and reading instruction. Several studies, in early 1980s, also addressed the use of visual media in instruction of the deaf. Murray and Sweeney (1980) designed an

129

elaborate package for group instruction in computer operation. The package contained slides, captions stored on a filmstrip, and an illustrated workbook. Wise (1980) developed a series of television programs specifically designed for the frofoundly deaf learners. Nugent (1983) tested the instructional effectiveness of visuals and captions in films and videos used in teaching of 10-14 years old children. The students who viewed visuals plus captions performed significantly better than those who received captions or visuals alone. All these studies shared one common conclusion that using visual media in any format, as instructional aids would facilitate the learning processes in deaf individuals.

Sign language as a visual language has been the topic of investigation in several studies. Conlin and Paivio (1975) conducted two experiments, comparing deaf and hearing college and secondary school students on learning of paired associate lists of words varied in the level of their signability and visualization values. In another study by Bonvillian (1983), adolescent students' free recall of visually presented words, was examined. Results from these studies indicate that both hearing and deaf learners performed significantly better on word pairs with high-imagery than low-imagery values, however, signability facilitated the recall only for the deaf learners. One major concluding point was that for the deaf the knowledge of sign language plays a significant role in their memory and recall of information.

Several studies (Grant, 1983; Pickover, 1985; Rose, 1983) used computer graphics as the means for production of mental images in deaf learners to enhance their skills in problem solving and creative efforts. Using computer generated cartoons, graphic symbols, or logo images, the students were encouraged to solve problems without the obstacles of verbal language. The experience improved not only the problem solving skills of the students, it also increased their level of motivation. The results from these studies provide a strong rationale for using visuals in form computer graphics in teaching of higher level learning tasks to the deaf individuals.

The characteristics of visual memory of the deaf learners was the subject of investigation for several studies. Espeseth (1969) developed a program to increase the visual- sequential memory skills of a group of deaf children. The treatment proved to be significantly effective. In a study conducted by Bugelski (1974), deaf and hearing students were compared in tasks involving remembering complex drawing patterns and word pairs. The result indicates that imagery as well as verbal mediation is involved in the memory processes of both hearing and the deaf individuals. The role of age in visual and auditory processing among deaf and hearing at two age range of 10-12 and 15-18 was tested by MacDougall (1979). The result was quite interesting. Young deaf children were found to rely mostly on visual processing, while older deaf children used both auditory and visual cues in memorization. With hearing children, the developmental pattern was reversed - the young group depended only on auditory processing, while the older took advantage of both modalities - visual and auditory.

The role of age in visual memory processing was tested also in two studies by Younis & Robertson. In the first research (1969), young children were given the task of visualizing the level of water in a rotated object. The findings provided a strong evidence for age as a determining factor in the children's imagery ability. In this study, the older children solved more visual problems and indicated more control over their imagery skills. Once again deafness did not differentiate between the two groups as the variable of age did. The result was indicative of development of advanced symbolism among the deaf subjects. In the second research, Younis and Robertson (1970) examined the children's ability in projecting their mental images on two tasks. The first task required the children to adopt a point of view from a list of eight options presenting a three-object scene, and the second task asked for prediction of relative positions of a rotating or a fixed square. The analysis of data supported two conclusions; first, deafness failed to differentiate between the two groups; and second, older children performed consistantly superior in the visual tasks when compared to the younger group. The result from these studies supported Piaget's theory that mental imagery and symbolic processing of information are the characteristics of the formal-operational stage in the process of intellectual development.

Deafness did not differentiate also in another study by Tweney, Hoeman & Andrews (1975). Deaf and hearing adolescents between the ages of 16-18 demonstrated the same characteristics in semantic organization when sorting sound words or noun words and their corresponding pictures. The conclusion was that the deaf individuals were not dependent on visual mediators in the verbal performance.

These findings were contradicted by Kelly (1976). who researched the hemispheric processing of words and pictures of children in the 3rd, 4th and 5th grades. The deaf children in this study depended largely on right hemisphere when processing words with high and low imagery values. Kelly concluded that young deaf children do not develop the same hemispheric specialization found in hearing children.

Several studies by Stuckless (1978) reported some contradicting results on temporal and spatial sequential information processing of deaf as compared to hearing subjects. Fingerspelling and a video monitor were used as the formats for presenting the temporal and spatial sequential information. In one study, hearing subjects'performance was superior to the deaf on the temporal sequencing (fingerspelling). However in another study Stuckless (1978) the reverse result was found.

The final category of research on visualization and deafness is induced imagery. As it is defined, induced imagery involves constructing mental imagery without any external visual counterpart. Several studies were designed to explain the effectiveness of this type of imagery , especially in the learning of verbal information. Usudo (1985) devised a teaching method to assist the deaf learners to construct mental images of categories consisting introgative words, and then recall some content words included in those categories. The method involved four steps. At the final step, deaf children were able to recall features of objects in the categories by using interrogatives as cues. They also learned to categorize the content words based on their meanings.

Parasnis (1980) tested for mental imagery as mediators in recall and recognition of signs and words with varying imagery values among deaf and hearing subjects fluent in sign language. The result indicated that the effort of imagery was qualitatively similar for both groups. The final conclusion was that sign language is processed in the same manner as words.

The role of induced imagery was tested in several studies comparing the deaf, blind and normal individuals. Marchant & Malloy (1984) administered two paired associate tests consisting of words able to evoke auditory, tactile and visual imagery. The subjects were instructed on imagery production. The result indicated that imagery rating related directly to the content of imagery generated. Also, it was found that sensory impairment reduced performance with words that stimulated imagery in that modality. In a similar study, Craig (1973) tested Paivio's dual coding hypothesis, by comparing deaf, blind and normal subjects. An hypothesis was made

that the deaf subjects would store information only in visual code in contrast to the blind who would use exclusively auditory - motor coding system.
The result obtained were interesting . All groups recalled high imagery words better than low imagery words, contradicting the prediction that it would be the case only for the deaf and normal subjects and not for the blind subjects. Paivio's dual coding information processing hypothesis was supported.

Two Italian researcher, Cornoldi and Sanavio (1980) conducted a similar study, using a list of nouns varied in respect to their level of imagery value (high, medium, low). They found that the deaf subjects used dual system of imaginal and verbal for mental processing of information. However they found that the deaf dependent more on imaginal system for recall of information.

Reviewing the research during the last twenty five years, some gaps are easily realized. There is need for longitudinal studies on image development in children. More specific studies on the hemispheric specialization among deaf individuals could respond to the existing contradictory results in this area. Research could be initiated related to cross-cultural differences in visualization among deaf subjects. Another erea that is completely open for investigation is qualitative difference of imagery production among deaf subjects. Finally, further studies could examine the application of imagery research in design and development curriculum for the deaf learner.

VISUALIZATION & DEAFNESS
BIBLIOGRAPHY

Sign Language

1. Bonvillian, J. D. (1983). Effects of signability and imagery on word recall of deaf and hearing students. *Perceptual and Motor Skills*, *56*(3), 775-91.

2. Conlin, D. & Paivio, A. (1975). The associative learning of the deaf: the effects of word imagery and signability. *Memory & Cognition*, *3*(3), 335-340.

Computer Graphics

1. Grant, J. & Semmes, P. (1983). A rationale for logo for hearing-impaired preschoolers. *American Annals of the Deaf*, *128*(5), 564-569.

2. Pickover, C. A. (1985). On the educational uses of computer-generated cartoon faces. *Journal of Educational Technology Systems*, *13*(3), 185-98.

3. Rose, S. (1983). Computer graphics and creativity/problem solving skills with deaf and severely language disordered students: parts I, II, and III. Paper presented at the Council for Exceptional Children Topical conference on the use of Microcomputers in Special Education (Hartford, CT, March 10-12)

Visual Memory

1. Bugelski, B. R. (1974). Words and things and images. Przeglad Psychologiczny, 17(1), 75-96.

2. Espeseth, V. K. (1969). An investigation of visual-sequential in deaf children. American Annals of the Deaf, 114(4), 786-9.

3. MacDougall, J. C. (1979). The development of visual processing and short-term memory in deaf and hearing children. American Annals of The Deaf, 124(1), 16-22.

Induced Imagery

1. Cornoldi, C. & Sanavio, E. (1980). IMagery value and recall in deaf children. Italian Journal of Psychology, 7(1), 33-39.

2. Craig-Ellis, M. (1973). Role of mental imagery in free recall of deaf, blind and normal subjects. Journal of Experimental Psychology, 97(2), 249-253.

3. Marchant, B. & Molloy,T. (1984). Auditory, tactile, and visual imagery in PA learning by congenitally blind, deaf, and normal adults. Journal ofMental Imagery, 8(2), 19-32.

4. Parasnis, ILA. (1980). The effect of imagery for signs and words. Dissertation Abstracts International, 41(6-B) 2367.

5. Robertson, A. (1969). Anticipatory visual imagery in deaf and hearing children. Child development, 40(1), 123-125.

6. Usuda, E. & Sudo,T. (1985). Teaching of interrogative for hearing children: when,where, what and how. Japanese Journal ofSpecial Education. 23(3), 1-12.

Cognitive Strategy

1. LaSasso, C. (1985). Visual matching test taking strategies used by deaf readers. Journal of Speech and Hearing Research, 28(1), 2-7.

2. Pschirrer, L. (1980). Using imagery to teach independent pronunciation skills to deaf college students. American Annals of the Deaf, 125(6), 855-60.

Modality Preference

1. Allen, D. V. (1969). Modality aspects of mediation in children with normal and with impaired hearing ability. Final report. (Grant No.: OEG-0-8-070837-1858). Office of Education (DHEW), washington, D.C. Bureau of Education for the Handicapped. (ERIC Ducument Reproduction Service No. ED 039 697).

2. Heien, J. R., Stock, W. A. & Tharinger, D. (1974). Modality-specific imagery and associative learning in the deaf and hearing. Bulletin of the Psychonomic society, 4(5-A), 462-464.

3. Heinen, J. R., Cobb, L. & Pollard, J. W. (1976). Word imagery modalities and learning in the deaf and hearing. Journal of Psychology, 93(2), 191-195.

4. Hung, D. L. & Tzeng, O. J. (1981). A chronometric study of sentence processing in deaf children. Cognitive Psychology, 13(4), 583-610.

5. Johnson, R. A. (1981). Sensory images among deaf adolescents. Journal of General Psychology, 105(1), 167-168.

6. Mythili, S. P. & Padmapriya, V. (1987). Paied associate learning with auditory and visual imagery among blind, deaf and normal children. Journal of the Indian Academy of Applied Psychology. 13(2), 48-56.

Visual Processing

1. Kelly, R. R. (1977). Deaf children's hemispheric processing of words and pictures visualy presented to the hemifield. Dissertation Abstract International, 37(7-B), 3664.

2. Reese, H. W. & Parkington, J. J. (1973). Intralist interference and imagery children. Journal of Experimental Child Psychology, 16(1), 165-183.

3. Stuckless, E. R. (1978). Technology and the visual processing of verbal information by deaf people. American Annals of The Deaf, 123(6), 630-36.

4. Tweney, R. D., Hoemann, H. W. & Andrews, C. E. (1975). Semantic organization in deaf and hearing subjects. Journal of Psycholinguistic Research, 4(1), 61-73.

5. Youniss, J. & Robertson, A. (1970). Projective visual imagery as a function of age and deafness. Child Development, 41(1), 215-224.

Imposed imagery

1. Dardig, J. C. (1974). A visual literacy program for deaf students. Audiovisual Instruction, 19(8), 24-27.

2. Freebairn, T. (1974). Television for deaf people: selected projects. (Research report No. 143), Deafness Research and Training Center, New York Univ., N. Y.

3. Murray, R. H. & Sweeney, J. (1980). Superimposing visual cues and captions over slides to teach computer ioperation. American Annals of Deaf, 125(6), 731-42.

4. Newby, R. (1974). Language and Reading: a visual structure. American Annals of the Deaf, 119(5), 572-7.

5. Nugent, G. C. Deaf students' learning from captioned instruction: the relationship between the visual and caption display. Journal od Special Education, 17(2), 227-34.

6. Perrin, D. G. (1969). The role of media in individualized instruction for teaching the deaf. American Annals of the Deaf, 114(5), 912-9.

7. Reynolds, H. N. & Rosen, R. F. (1973, March). The effectiveness of testbook, individualized, and pictorial instructional formats for hearing impaired college students. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

8. Wise, A. & Hill, R. (1980). Television and the deaf. Journal of Educational Television and Other Media, 6(2), 59-60.

EXAMINING VISUAL LITERACY, 1983-1989 : A SEVEN-YEAR IVLA BIBLIOGRAPHY

Alice D. Walker

Adams, D. M., & Hamm, M. (1987). The power of electronic images: Changing our relationship to knowledge. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 159-164). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Adams, D. M., & Hamm, M. (1988). Video technology and moral development: The role of electronic media. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 190-196). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Akanbi, M. R., & Dwyer, F. M. (1989). The effect of inductive and deductive instructional strategies on students' ability to profit from visualized instruction. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 1-10). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Andris, J. F. (1989). Digitizing, paint programs and visual literacy. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 11-16). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Angle, K. B. (1989). Photography as an intervention strategy in the verbal composing process. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 17-22). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Aust, R. J., & Harrington, R. G. (1988). An agenda for conducting research and learning with visuals in the affective domain. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 311-322). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Bagget, P. (1989). Mixing verbal, visual, motoric elements in instruction: What's good and what's not. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 23-33). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Bakony, E. (1983). Some aspects of meaning in film aesthetics. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 9-18). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Barrows, M., & Workman, P. (1988). Young publishers. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 175-176). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Barry, A. & Leaver, A. (1989). Teaching visual literacy through Newspeak: A unit model for integrating visual literacy principles and practices in the secondary English classroom. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 34-39). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Barry, A. M. S. (1988). Turning visual image into thought process: Eisenstein's perceptual theory as the basis of montage methodology in film. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 224-232). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Bassett, R. (1984). The potential of computerized multi-image production. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 337-340). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Baylor, J. G. (1989). Computer generated instructional graphics. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 40-44). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Beauchamp, D. G. (1987). Desktop confusion. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 311-314). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Beauchamp, D. G. (1988). Developmental techniques to promote research and learning with visuals in the affective domain. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 299-301). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Becker, A. D. (1987). Tracing the codes of educational and instructional television. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 285-291). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Becker, L. A. (1984). Richard Wawro, artist. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 27-33). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Belland, J. C. et al. (1989). Interpreting three-dimensional computer-generated images--A history of a line of research. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 45-52). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Bennett, L. T. (1989). Visual literacy: A factor of text design and reading instruction. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 53-58). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Bernard, R. L. (1986). Using video essays as a bridge to traditional literacy skills. In L. W. Miller (Ed.), Creating meaning (pp. 66-71). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Besser, H. (1986). The meaning behind computer advertising. In L. W. Miller (Ed.), Creating meaning (pp. 44-54). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Besser, H. (1987). Computers for art analysis. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 121-129). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Blevins, T. E., & Moore, D. M. (1989). The effects of cognitive style and a supplantation technique on a picture detail recognition task. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 520-526). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Blinn, L. M., & Blair, C. M. (1984). An analysis of visual recruitment materials used in higher education. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 83-91). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Bloom, L. P. R., & Braden, R. A. (1984). Creative visualization with microcomputers. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 345-352). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Bogert, J. (1989) Designing visuals to complement the message. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 59-72). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Braden, R. A. (1983). The National Film Board: Film in a social context. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 19-44). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Braden, R. A. (1983). Visualizing the verbal and verbalizing the visual. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 149-163). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Braden, R. A. (1985). The stylish look: A format for visual literacy writers. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 157-161). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Braden, R. A. (1987). Writing about visual literacy. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 1-4). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Braden, R. A. (1988). Visual aspects of desktop publishing: YGWYS, not WYSIWYG. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 177-180). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Braden, R. A. (1989). Task analysis for visual-verbal cross coding learning tasks. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 73-78). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Braden, R. A., & Beauchamp, D. G. (1987). Catering to the visual audience: A reverse design process. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 227-232). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Braden, R. A., & Bloom, L. P. R. (1984). Art and science: Visualizing with microcomputers. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 353-363). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Branigan, M. (1989). Film archives: Preserving our heritage. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), *About visuals: Research, teaching and applications* (pp. 79-87). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Brenner, B., & Atkinson, M.A. (1987). Non-traditional computer use in the humanities classroom. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visible & viable: The role of images in instruction and communication* (pp. 137-142). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Bringolf, P. (1983). Holography: A medium in the making. In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 183-187). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Brizee, S. L. (1983). Plains indian pictographic painting: More than art. In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 69-76). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Bruno, E. M. J. (1988). Desktop publishing update—a presentation of the latest equipment and programs for using personal computers to "Publish it Yourself." In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visual literacy in life and learning* (pp. 185-189). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Bullard, C. S. (1983). Proto-conversations: Communication strategies of the hearing impaired infant. In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 87-94). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Burbank, L. & Pett, D. (1989). Designing instructional materials: Some guidelines. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), *About visuals: Research, teaching and applications* (pp. 527-535). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Cahill, S. D. M., & Cherrington, J. (1983). Loneliness in the preteens: A social comment. In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 301-312). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Clark, G. A. (1984). Development and testing of a visual concept generalization test based on visually complex art reproductions. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), _Enhancing human potential_ (pp. 155-162). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Cleaver, B. (1989). Providing access to visual information. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), _About visuals: Research, teaching and applications_ (pp. 88-93). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Clements, E. (1984). Attention: A theoretical perspective. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), _Enhancing human potential_ (pp. 140-147). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Colwell, C., Mangano, N., & Hortin, J. A. (1984). Humor and visual literacy: Keys to effective learning. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), _Enhancing human potential_ (pp. 313-320). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Considine, D. M. (1986). The depiction of power in the visual media: Identifying and interpreting images. In L. W. Miller (Ed.), _Creating meaning_ (pp. 29-35). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Couch, R. (1989). The rise and fall of the U.S. Film Service: Good films were not enough. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), _About visuals: Research, teaching and applications_ (pp. 94-104). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Culkin, J. (1983). Understanding media . . . after McLuhan. In R. A. Braden & A. D. Walker (Eds.), _Seeing ourselves: Visualization in a social context_ (pp. 47-48). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Curtiss, D. (1988). An artist's view of visual literacy for the non-artist. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), _Visual literacy in life and learning_ (pp. 337-347). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Curtiss, D. (1989). A visual evolution. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), _About visuals: Research, teaching and applications_ (pp. 105-112). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Debes, J. L. (1984). Reading or not, I am coming. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 9-18). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

DeCocker, J., & Williams, L. (1983). Exploring a school: A visual adventure. In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 297-300). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

DeCocker, J., & Williams, L. (1985). A kindergarten documents itself. In N. J. Thayer & S. Clayton-Randolph (Eds.), *Visual literacy: Cruising into the future* (pp. 139-141). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

deLeeuw, G. J., Eshpeter, B. J., & Carswell, R. J. B. (1983). Visual learning: Transactional, expressive, or poetic? In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 129-136). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Deming, R. H. (1984). Television news: Analysis of visuals. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 325-329). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Desfor, D. (1985). Uncovering content: Deceptive and valid in photographs. In N. J. Thayer & S. Clayton-Randolph (Eds.), *Visual literacy: Cruising into the future* (pp. 35-36). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Dobbs, B. A. (1988). Video—friend or foe? or How to teach the reading of seeing. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visual literacy in life and learning* (pp. 12-14). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Dubinsky, L. (1983). The child's discovery of space or "I saw it on television". In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 217-221). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Duffy, B. (1987). Learning styles and instructional technology. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visible & viable: The role of images in instruction and communication* (pp. 95-100). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Dunker, L. H. (1984). Using the computer for effective display of visual language. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 341-344). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Durden, J. S. (1989). Using the mask as a vehicle of communication. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 113-116). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Dwyer, F. M., & De Melo, H. (1984). A systematic assessment of the effects of visual testing of visualized instruction: A justification for instructional congruency. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 223-246). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Dwyer, F. M., & Dwyer, C. A. (1989). Enhancing visualized instruction: A research overview. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 117-127). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Dwyer, F. M., Dwyer, C. A., & Canelos, J. (1989). An overview of the program of systematic evaluation (PSE). In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 128-142). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Entin, A. D. (1983). The family photo album as icon: A family systems approach to reading photographs. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 107-113). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Eshpeter, B., & DeLeeuw, G. J. (1984). Helping children to apply a conceptual model to the making of photographs. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 129-139). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Evans, A. M. (1985). The art program at South Fields College. Leicester, England. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 163-168). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Ferro, S., & Weller, H. G. (1989). Effect of presentation rate on immediate recall of concrete nouns using imagery. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 143-150). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Flatt, F. (1988). Creating an image. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 348-350). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Fleming, M. (1984). Visual attention to picture and word materials as influenced by the characteristics of learners and design of materials. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 109-115). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Forrest, C. (1987). Aspect ratio: The projected and televised image. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visible & viable: The role of images in instruction and communication* (pp. 293-301). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Fredette, B. W. (1984). Is art the "literature" of visual education. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 275-284). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Fryear, J. (1983). Video enhanced human relations training. In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 223-228). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Garoian, C. R. (1989). Teaching visual literacy through art history in high school. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), *About visuals: Research, teaching and applications* (pp. 151-160). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Gautreau, R., et al. (1988). Videodisc visuals for learning physics. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visual literacy in life and learning* (pp. 135-138). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Gnizak, E., & Girshman, R. (1983). Integration of the image and the word. In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 291-296). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Gnizak, E., & Girshman, R. (1984). Visualizing research. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 207-212). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Gonsalves, A. A. (1984). Validating visual literacy experiences—a five year affective study. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 187-196). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Good, B. L. (1987). K-12 curriculum integrated library media skills: The impact of visual motivators. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 233-240). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Gray, R. (1989). A paradigm for program development. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 161-166). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Griffin, R. (1989). A comprehensive study of the types of visuals used in business and engineering presentations. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 167-177). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Griffin, R. (1989). Using graphs correctly: What are the basic elements for the language of graphs. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 178-188). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Griffin, R., Miller, S., Whiteside, J. A., & Whiteside, M. F. (1985). Business people, PC's, and graphics programs come together. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 101-120). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Griffin, R., & Whiteside, J. A. (1984). Visual literacy: A model for understanding the discipline. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 70-82). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Griffin, R., Whiteside, M. F., & Whiteside, J. A. (1988). Computer generated graphics in business, education, and medicine. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 351-360). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Gueulette, D. G. (1987). Programmed visualization—bidden mental imagery for instructional design and scripting. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 205-219). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Gustafson, M. (1984). Utilizing educational materials appropriately when villagers are usually illiterate. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 163-173). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Hansen, Y. (1989). A formative evaluation study: Development of a visual thinking handbook for adult learners. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 189-197). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Hansen, Y. (1989). An adult handbook to develop visual thinking: How to use simple graphic tools for thinking, planning, and problem solving. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 198-200). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Hardin, P. (1983). Investigating visual communication in diagrams. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 143-147). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Hardin, P. (1988). Desktop publishing: Merging literacies. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 181-184). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Harms, J. (1987). Seeing is: Understanding and remembering. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 257-260). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Hanson, J. R., Silver, H. F., & Strong, R. W. (1988). Learning styles and visual literacy: Connections and actions. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 270-298). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Harper, D., & Dwyer, F. M. (1984). The effect of visualization as an aid in teaching grammatical concepts of German. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 213-222). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Head, J. T. (1988). Microcomputer graphics: The production of 35mm slides and transparencies for teaching and research presentations. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 361-367). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Head, J. T., & Moore, D. M. (1989). The recall of quantitative data and graphic format: An experimental study. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 201-208). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Hobbs, R. (1989). Taft School media project, year one: Uniting video production and critical television viewing. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 209-216). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Hortin, J. A. (1983). Imagery in our daily lives. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 123-128). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Hortin, J. A. (1984). Mental imagery and participatory instructional design. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 174-179). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Hortin, J. A. (1985). Research on internal and external imagery for problem solving. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 67-71). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Huffman, S. A, Jr. (1989). Education from the sky--The Virginia Tech experience with satellites. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 217-221). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Hunter, J. M. (1989). Visual literacy and political cartoons: An overview. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 222-228). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Hunter, P. E. (1989). Seeing is believing: Visual patterns across the curricula. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 229-241). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Hutton, D. W. (1983). Silicon pictures: A revolution in visual literacy. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 189-204). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Jacobs, A. (1983). Visual confrontation in working with chemically dependent adolescents: A synopsis. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 83-85). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Jacobs, N. E. (1984). Learning from television. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 148-154). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

James, J. (1989). Effects of prepared visuals and ability to create visual images on immediate recall in children. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 242-250). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Johnson, L. (1988). Cable television—public schools—visual literacy. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 63-75). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Joyner, O. (1989). Creativity revisited in computerland. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 251-255). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Kaller, J. (1983). Stereophonic television: A suggested biometric approach to measuring physiological impact on the viewer. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 177-181). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Kaufman, D., & Sketches, D. (1983). Designing visuals in self-instructional material. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 239-250). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Kellstrom, M. R. (1985). Story is image. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 65-66). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Kelly, M. F. (1987). "Let's draw": Art education by radio. A historical study. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 113-119). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Kenny, J. F. (1989). Visual impact: Techniques in video production. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 256-259). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Kervin, D. (1986). Reading images: Levels of meaning in television commercials. In L. W. Miller (Ed.), Creating meaning (pp. 36-43). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Kirk, D. L. (1986). Using imaginative imaging in teaching social studies. In L. W. Miller (Ed.), Creating meaning (pp. 80-86). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Kissick, B. (1987). Collecting stories and images using visual media with oral history. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 241-246). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Kissick, B., & Grob, D. H. (1988). A comparison of learning styles of academic and vocational male and females students. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 247-256). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Kissick, B., & Grob, D. H. (1989). As you see it: Visual literacy for adults. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 260-264). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Knupfer, N. N., & McIsaac, M. S. (1989). Graphics and text placement: The effect of wrap-around and framed text on reading speed and comprehension. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 265-272). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Koetting, J. R. (1988). Toward an alternative perception of the practice of schooling: Beyond mere effectiveness. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 80-97). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Konker, C. S. (1986). Human color perception: An examination of biological and cultural aspects of affective responsiveness. In L. W. Miller (Ed.), Creating meaning (pp. 22-28). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Krauss, D. A., et. al. (1984). A phototherapy project. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 413-417). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Lacy, L. (1987). An interdisciplinary approach for students K-12 using visuals of all kinds. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 45-50). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Lacy, L. (1988). Thinking skills and visual literacy. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 33-40). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Lacy, L. (1989). Look, think, act: Minneapolis Public Schools program in visual education. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 273-276). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Lampe, S. L. (1984). Visual literacy and cognitive style: Assessing field dependency with theatrical slides. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 116-128). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Larson, M. E. (1989). Infology and desktop publishing: Is there a relationship? In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 277-285). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Librero, F., & Moldstat, J. (1984). Audio-visual utilization by School of Education faculty at Indiana University (Bloomington). In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 197-206). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Limburg, V. E. (1988). Ethical considerations in visual literacy. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 396-402). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Lind, R. W. (1988). Visual value. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 403-412). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Livesley, J., & Hyne, L. (1983). Curriculum applications of critical viewing skills. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp.313-343). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Love, L., & Acheson, C. (1983). Open Learning Institute Telidon project. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 229-236). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Low, C. (1983). Visualization in a social context: The Canadian documentary film. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 3-7). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Ludes, L. (1985). Visual createdness in education and design. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 3-7). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Marschalek, D. (1987). Visual arts index system. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 101-104). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Martinello, M. L. (1984). Visual thinking and humanities detective work: An undergraduate course for secondary students. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 299-308). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Martinello, M. L. (1986). Visual thinking in the elementary curriculum: Teaching strategies and learning activities. In L. W. Miller (Ed.), Creating meaning (pp. 58-66). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Mason, S. H. (1989). Showing students what things are: An introduction to basic film terms. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 286-290). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Massoth, C. (1987). Considerations for graphic design of projected media. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 197-203). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Maxham, J. (1983). In-sight. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 63-68). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

McIsaac, M. (1983). Reading photographs: The anthropological paradigm. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 137-141). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

McIsaac, M. (1984). Identification by art and non-art majors of content, impression, and technical form in pictures. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 180-186). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

McIsaac, M. (1985). Photography's subliminal messages: Whiskey, women and the workplace. In N. J. Thayer & S. Clayton-Randolph (Eds.), *Visual literacy: Cruising into the future* (pp. 31-34). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

McIsaac, M. (1988). Turkey: Conflicting values, contrasting images. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visual literacy in life and learning* (pp. 394-395). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

McKeown, T. (1983). Aladdin's lamp. In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 259-266). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Metallinos, N. (1983). Biometric research instruments and measuring techniques. In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 171-176). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Metallinos, N. (1988). Computerized television: Technology overshadows aesthetics. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visual literacy in life and learning* (pp. 143-155). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Metallinos, N. (1989). Figure/ground anomalies in commercial television: A diagnostic study. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), *About visuals: Research, teaching and applications* (pp. 291-303). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Miller, L. W. (1984). Your telephone book--a basic key to visual literacy for ESL students. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 45-52). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Miller, L. W. (1987). Visual literacy across the curriculum. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visible & viable: The role of images in instruction and communication* (pp. 105-112). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Miller, L. W. (1988). Identifying the telecourse student: Who she is and what she wants. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 323-328). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Miller, L. W. (1989). Teaching visual literacy with films and video. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 304-309). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Mills, J. L. (1983). Men and women speak different body language. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 49-61). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Mills, J. L. (1984). Rapport and hierarchy: You can see the difference! In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 53-67). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Molek, R. (1984). Visual technology and the development of active visual learning. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 381-390). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Montgomery, P. (1983). MUNG: Making the computer talk back. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 205-207). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Montgomery, P. (1985). Fragments stored against McLuhan's ruin. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 9-14). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Moore, D. M. (1985). Effects of cognitive style on size and type of visuals. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 81-87). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Moore, D. M. (1988). The effects of presentation order and contextual background on cognitive style. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 257-269). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Moore, J. (1985). Designing effective interactive video visual displays. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 95-99). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Moriarty, S. E. (1986). Literal and symbolic visuals. In L. W. Miller (Ed.), Creating meaning (pp. 3-10). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Moriarty, S. E. (1987). The function of visuals in mass communication. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 221-225). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Mortier, R. S. (1984). See levels. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 34-44). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Muffoletto, R. (1984). Visual literacy and teacher education: A pedagogical strategy. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 263-274). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Muffoletto, R. (1985). Reflective teaching and visual literacy: Teacher intervention and programmed instruction. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 51-61). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Muffoletto, R. (1987). Reading the visual text: Dancing to the music. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 251-256). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Muffoletto, R. (1988). Teaching visual literacy to teachers. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 17-25). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Munday, R. B., & Sewell, E. H., Jr. (1989). Ideas in the mail: Visual propaganda in postage stamps. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 310-312). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Myers, P. (1985). Visual literacy, higher order reasoning, and high technology. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 39-50). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Nath, J. (1983). The use of still photography as learning assistance for the language handicapped in the classroom. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 115-119). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Nelson, W. (1989). Visual representations of menu items in computer systems. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 313-319). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Newhouse, B. S., & Kellstrom, M. R. (1984). Cave psychology: Visual education. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 19-26). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Nickerson, B. (1983). Uthenics. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 165-170). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Nicoson, R. R. (1989). Toward a still-motion theory for multi-image production. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 320-327). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Nikola-Lisa, W. (1987). From LOGOS to LOGON: Media in the integrated curriculum. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 65-73). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Nixon, S. J. (1984). Cameras in the curriculum: A challenge to teacher creativity. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (p. 262). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Novemsky, L., Kimmel, H., & O'Shea, M. (1988). Sparking learning in middle schools with interactive videodiscs. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 121-124). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Nuell, L. (1983). Brainstorming visual literacy in art education. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 257-258). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Oudejans, M. (1985). The effect of hemispheric specialization on the visual arts, or, can art survive in a technical, left hemisphere-dominated civilization? In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 15-29). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Oudejans, M., & Tilroe, R. (1983). Eye and brain: An exploration of human perception. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 285-289). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Oudejans, M. (1988). The photograph: An icon of violence or peace? In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 374-383). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Pettersson, R. (1984). Picture legibility, readability, and reading value. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 92-108). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Pettersson, R. (1985). Numeric data, presentation in different formats. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 121-136). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Pettersson, R. (1986). Literal and symbolic visuals. In L. W. Miller (Ed.), Creating meaning (pp. 11-15). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Pettersson, R. (1986). Presentation of information in interactive systems for learning. In L. W. Miller (Ed.), Creating meaning (pp. 16-21). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Pettersson, R. (1987). Image-word-image. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 165-181). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Pettersson, R. (1988). Interpretation of image content. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 233-246). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Petty, B. A., & Payne, C. D. (1988). Beyond the three R's: A cooperative venture. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 47-49). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Phillips, J. (1988). Architectural photographs promote student awareness and aesthetic appreciation. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 384-393). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Ragan, T. J., Belland, J. C., & Smith, M. A. (1987). Using the Macintosh and Laserwriter: A case study in visual/verbal productivity. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 21-28). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Ragan, T. J., & Blitch, J. (1983). Visual literacy and the microcomputer: Children, the Apple computer and Logo. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 209-216). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Ragan, T. J., & Burroway, R. (1984). Microcomputer graphic capabilities: A demonstration and discussion of interactions with visual literacy goals. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 371-380). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Ragan, T. J., & Rezabek, L. L. (1987). Visual processing: Using computers to do for visual literacy instruction what word processing can do for writing instruction. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 87-94). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Ragan, T. J. (1988) Foundations for a visual perceptual development curriculum. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 1-11). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Ramsey, I. (1988). Using filmstrips in the classroom to develop comprehension skills. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 76-79). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Ramsey, I. (1989). Using filmstrips to develop reading comprehension skills. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 328-332). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Raymond, D. L. (1988). Nurturing photographic creativity while maintaining individuality. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 368-373). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Reardon, L. (1989). The effects of presentation mode and cognitive style on immediate recall of map information. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 333-341). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Rezabek, L. (1988). See Jane, see Jane compute?: Perceived credibility of adolescent female talent in visual presentations on computer use. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 105-120). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Rezabek. L. (1989). Visual literacy in media and technology texts: A content analysis with implications for teacher education. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 342-348). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Rezabek, R., Ragan, T. J. (1988). Hypertext and elaboration theory: Use of visual epitomes for learning complex, multi-topic material. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 302-310). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Rice-Jones, K. (1983). Why take art? In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 255-256). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Risberg, D. D. (1989). Contemporary strategies in photographic education. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 349-356). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Robinson, R. S. (1984). Using television to teach visual literacy: "You've ruined TV for me". In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 330-335). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Robinson, R. S. (1986). Production practices: Television elements and the creation of meaning. In L. W. Miller (Ed.), Creating meaning (pp. 87-96). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Robinson, R. S. (1987). Visual literacy enhancement through library programs. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 35-43). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Robinson, R. S. (1988). An investigation of narrative television comprehension: Factors of visual literacy. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 185-189). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Robinson, R. S., et al. (1989). Visual literacy courses at the college level: Panel discussion. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 357-366). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Roos, B. (1988). A model for a scriptwriting workshop. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 208-213). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Rose, E. D. (1986). Reality, illusion and credibility: Meaning we take from the docudrama. In L. W. Miller (Ed.), Creating meaning (pp. 55-57). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Roth, S. (1989). The effect of the animation variable in computerized instruction on the comprehension and application of concepts of perspective drawing. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 367-374). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Rowe, M. (1987). Educating youth in the television age. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 143-145). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Saxton, B. (1988) VCR visual techniques for fifth and sixth graders—more than turning it on! In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 41-46). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Schiller, H. A. (1987). Visual literacy in ancient and modern man (Part I). In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 263-284). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Seels, B. (1988). Dynamite approaches to visual literacy: What's happening in Pittsburgh. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 50-62). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Sewell, E. H., Jr. (1984). A visual rhetoric of the Protestant Reformation: The use of cartoons to spread literacy. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 248-258). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Sherarts, K. (1987). New approaches in media education for physically handicapped adolescents. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 75-86). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Sinatra, R. (1983). How visual compositions aid visual and verbal literacies. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 267-275). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Sinatra, R. (1984). Visual/spatial strategies for writing and reading improvement. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 285-298). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Sinatra, R. (1987). Effects of visual ordering on the writing process. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 73-80). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Sinatra, R. (1988). Use of graphics to conceptualize meaning in language arts CAI. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 125-133). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Sinatra, R., & Beaudry, J. (1989). The use of design and pictures to structure the writing process. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 375-393). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Smith, M. R., & Blinn, L. M. (1985). Visual information for the consumer: An undergraduate course with a multi-disciplinary focus. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 143-147). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Smith, P. L., & Ragan, T. J. (1989). Designing visual analogies for instruction. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 394-405). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Stewig, J. W. (1989). An experimental visual literacy program in schools. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 406-414). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Sucy, J. (1985). Why do visual literacy projects fail? In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 149-155). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Sullivan, B. (1983). The Rubik's cube: A post nuclear symbol. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 77-81). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Sutherland, S. (1988). Wayfinding in computerized card catalogs: Library of Congress vs. Gallaudet University. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 156-174). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Sutherland, S. (1989). The forgotten typographic research of Miles Albert Tinker. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 415-428). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Sutton, R. E. (1983). A report on the college course Visual Literacy: Learning to See. In R. A. Braden & A. D. Walker (Eds.), Seeing ourselves: Visualization in a social context (pp. 277-284). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Sutton, R. E. (1984). Drawing on the right brain with students: An application report. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 321-324). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Sutton, R. E. (1987). Watch: Critical viewing guide for children. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visible & viable: The role of images in instruction and communication* (pp. 51-54). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Thompson, M. E. (1988). Interactive video in the classroom. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visual literacy in life and learning* (pp. 139-142). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Thompson, M. E. (1989). Field articulation and the design of information for microcomputers. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), *About visuals: Research, teaching and applications* (pp. 429-434). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Tiffany, J. (1987). Elements of a short course in effective visual communication. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visible & viable: The role of images in instruction and communication* (pp. 55-63). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Tripp, S. D. (1989). Using a visual metaphor to represent command language syntax. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), *About visuals: Research, teaching and applications* (pp. 435-450). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Venerable, G. (1988). The arts—An instrument of vision. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 185-189). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Vogel, C. M. (1989). Analysis towards expression: A structured approach to teaching three dimensional design. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), *About visuals: Research, teaching and applications* (pp. 451-462). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Walker, J. (1984). The creative elderly. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 407-412). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Weaver, P. (1983). Photography: A picture of learning. In R. A. Braden & A. D. Walker (Eds.), *Seeing ourselves: Visualization in a social context* (pp. 95-106). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Weiser, J. (1984). Phototherapy—becoming visually literate about oneself. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), *Enhancing human potential* (pp. 392-406). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Wescott, R. W. (1984). Opening our eyes and stretching our minds. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 3-8). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Whiteside, H. C. (1984). Enhancing computer literacy through visual literacy. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 364-370). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Whiteside, H. C. (1986). Visual literacy awareness in college-level educational media courses. In L. W. Miller (Ed.), Creating meaning (pp. 97-100). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

Whiteside, H. C. (1987). Can multi-image presentations be affective and effective in education. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 183-196). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Whiteside, H. C., & Blohm, P. (1985). The effects of CRT text color and decision making tasks on learners' recall. In N. J. Thayer & S. Clayton-Randolph (Eds.), Visual literacy: Cruising into the future (pp. 89-94). Western Sun Printing Company, Inc., Bloomington, IN: International Visual Literacy Association, Inc.

Wileman, R. E. (1989). Pre-electronic illusionary devices: 19th century tricks on the eye. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 463-465). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Wilshire, D. T. (1989). Effectiveness and efficiency of elaboration using computer-assisted instruction. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 466-480). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Williams, E. E. (1988). How I teach visual literacy in my basic educational media classes. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 26-32). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Williams, L. (1984). Visual education in British primary schools: 1983. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 259-261). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Wilson, J. J. (1988). A reality: Visual literacy's connection to literacy in the language arts. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visual literacy in life and learning (pp. 98-104). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Wilson, T.G. (1987). The medium of wordless picture books: An overview of classroom applications. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 5-19). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Wisely, F. G. (1987). Defining the functions of visuals used to support verbal narration in audiovisual presentations. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 247-250). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Wisely, F., Kennett, D., & Bradford, J. (1989). Development of visual communication courses. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 481-488). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Witte, M. S. (1987). Learning perceptual flexibility through figure-ground strategies in 2-d design. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 303-309). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Witte, M. S. (1989). Learning to look: Reversing strategy for perceptual change. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 489-496). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Witte, R. L., & Witte, M. S. (1984). A whole brain approach to creative problem solving. In A. D. Walker, R. A. Braden, & L. H. Dunker (Eds.), Enhancing human potential (pp. 309-312). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Wolf, J. C. (1987). Public speaking with computer assisted visual images: A key to creativity. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), Visible & viable: The role of images in instruction and communication (pp. 131-136). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Wood, G. M., & Dwyer, F. M. (1989). The additive effect of visualization and overt response/visual feedback in facilitating student achievement of different educational objectives. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching and applications (pp. 497-508). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Woodburn, M., & Woodburn, R. (1989). Drawing on the iconic process from within and without: Enhancing memory, logic and creativity. In R. A. Braden, D. G. Beauchamp, L. W. Miller, & D. M. Moore (Eds.), *About visuals: Research, teaching and applications* (pp. 509-519). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Yeaman, A. R. J. (1987). Effective communication and better access: Improving the design of library signs. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visible & viable: The role of images in instruction and communication* (pp. 29-33). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Yeaman, A. R. J. (1988). Research on electronic text. In R. A. Braden, B. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visual literacy in life and learning* (pp. 197-207). Virginia Polytechnic Institute and State University, Blacksburg, VA: International Visual Literacy Association, Inc.

Zacher, C. M. (1987). Dynamic viewing--developing effective computer screens for computer-assisted instruction. In R. A. Braden, D. G. Beauchamp, & L. W. Miller (Eds.), *Visible & viable: The role of images in instruction and communication* (pp. 147-158). East Texas State University, Commerce, TX: International Visual Literacy Association, Inc.

Zarrillo, J. (1986). Creating meaning in elementary social studies: Alternative writing activities. In L. W. Miller (Ed.), *Creating meaning* (pp. 72-79). Image Graphics, Inc., Silver Spring, MD: International Visual Literacy Association, Inc.

EXTENDING VISUAL LITERACY

TEACHING VISUAL LITERACY USING A COMPUTER-BASED AUDIOGRAPHIC TELECOMMUNICATION SYSTEM

Landra L. Rezabek

The University of Wyoming has a history of providing educational opportunities for distanced learners within the state, and during the summer and fall of 1988 a computer-based audiographic delivery system was established to extend the capabilities of the existing audio teleconferencing system. The new audiographic system had the capability of transmitting and receiving visual as well as verbal information, and directors of the extended learning network wanted to offer a course which would test the limits of the new system. Partially because of the highly visual nature of the course content, an introductory course in visual literacy was chosen as the first course to be delivered on the computer-based audiographic system during the fall of 1988. This paper focuses on the goals, content, and activities of the course itself; discusses development and delivery concerns; notes both successes and frustrations encountered during the semester; and offers suggestions to incorporate when teaching similar courses in visual literacy.

An Introduction to Visual Literacy: A Course Overview

The course in visual literacy which was taught using the audiographic system was targeted primarily toward teachers with no prior background in visual communication. The course was intended to expose students to the breadth of the field of visual literacy rather than focus on any particular area in depth. A general course goal was for students to investigate several of the many areas of study associated with the term visual literacy. Specific objectives indicated that students would be able to:

1. Provide a written definition of the term "visual literacy".
2. Analyze visual messages, demonstrating principles discussed in class.
3. Design and produce effective visual messages, demonstrating principles discussed in class.
4. Discuss orally and in writing several of the "strands" of the visual literacy movement and associated principles.
5. Apply principles of visual literacy in the design, production, and presentation of an instructional unit which furthers the visual literacy of a selected target audience.

Required texts were A Primer of Visual Literacy (Dondis, 1973) and Instructional Message Design (Fleming & Levie, 1978). Additional required readings included issues such as the role of visuals in textbooks (Brody, 1982) and instruction (Dwyer, 1972), perspectives on research in visual literacy (Dwyer & Dwyer, 1988; Levie, 1978), and visual education (Lacy, 1987a, 1987b). Students also selected articles to read from various conference proceedings of the International Visual

Literacy Association (IVLA). Students were cautioned that the required readings represented only a very limited range of possible topic areas related to visual literacy and they were required to locate readings in other areas of particular interest.

Activities and assignments included a variety of projects in addition to readings and class discussions. An early assignment was for students to visually represent "who they are" by assembling a collage which used no words. Collages were first viewed silently during class. When students had the opportunity to ask questions about and discuss the collages, the ensuing interaction not only helped "break the ice" but provided interesting observations regarding how students had arranged visuals and had chosen particular pictures. Students also noted how visuals could be misinterpreted, which led to discussions of the communication process and visual language. "The Edifice" section of the film, Why Man Creates (Bass, 1968), was shown without the audio portion of the film as a demonstration of the power of visual communication. Other sections of the film were used to generate discussion of the creative process, to encourage students to "take chances" when completing their projects, and to to foster a non-threatening atmosphere in which students could both receive and deliver constructive evaluation of class assignments.

An in-house slide-tape production, "Visual Elements in Art," and readings in Dondis were used to further the discussion of visual communication and language. Students selected, analyzed, and presented examples of basic elements of visual communication (line, color, texture) as well as techniques of visual communication discussed by Dondis (symmetry/asymmetry, unity/fragmentation, understatement/exaggeration). For this exercise, students covered their selected visuals with sheets of clear acetate so that examples could be marked and then erased, permitting several students to analyze each visual without the influence of prior markings. After completing the Dondis exercises, another in-house slide presentation introduced basic techniques of photographic composition. Following a guest lecture by a local photography teacher and further discussion, students practiced their visual fluency by creating sequential visual messages of 8-12 slides. Students also produced photo essays of 3-5 shots and these messages were discussed as well.

When reading the Fleming & Levie text, students were asked to design four instructional visuals, selecting and applying principles which were discussed in the book. Utilizing principles from each of the four sections of this text, students designed instructional visuals to promote: a) perception, b) memory, c) concept learning, and d) attitude change. Student projects included bulletin boards, posters, overheads, worksheets, manipulative activities, and other materials which could actually be used in the student's particular environment.

Class discussions progressed from the design of instructional visuals to the instructional use of visuals and on to the topic of visual education. Students viewed the slide-sound production, "Visual Education," produced by the Minneapolis Public Schools and Lyn Lacy (1987b). Students also read the related booklet (Lacy, 1987a) and discussed the impact of visuals on students and society. A professor from the English Department at the University of Wyoming provided a guest lecture on a similar topic, addressing film as a medium for visual communication and the transmission of culture. Students were advised that the impact of film and television on learning and instruction was an area only briefly mentioned in the class but one which deserved greater attention.

A highlight of the course was a live two-way audio teleconference which enabled students to talk with officers and other members of the International Visual Literacy Association who were attending the annual conference in Blacksburg, Virginia. Lida Cochran presented a short history of the organization, President Rhonda Robinson summarized current activities and research in the field, and President-Elect Roberts Braden discussed the future of the visual literacy movement. Other IVLA members participated in the discussion, and students valued this opportunity to talk with researchers, practitioners, and others interested in the field of visual literacy.

This three-hour course concentrated on providing a broad overview of the field, and students then selected particular areas of interest on which to focus during the preparation of final projects which were to further the visual literacy of a selected target audience. Projects ranged from a presentation designed to help elementary teachers evaluate instructional visuals in history textbooks to a lesson designed for junior and senior high school students dealing with visual messages delivered by phonograph album covers. Students used visual media when delivering their class presentations and each of the presentations was videotaped so presentations could be viewed by all class members. Students also composed sets of test questions which served as review aids and formed a pool of questions from which many of the final examination questions were drawn. The written exam included a great number of questions which required visual stimuli or visual responses which, as will be discused below, tested the limits of the audiographic delivery system as well as the knowledge of students.

Development and Delivery Concerns

In reading the course description related above, it is quite easy to forget that each of these activities was undertaken with the instructor and students being separated by hundreds of miles. The computer-based audiographic system linked three locations in Wyoming -- Laramie , Rawlins, and Douglas. Hardware at each site included an Epson computer with a portable hard disk drive storage system, two monitors (one RGB for video images and the other a color computer screen), a 300 BPS Voice-Too modem by Optel, Telewriter 3-PC software with an image capture board, a graphics tablet with Pendraw software, and the audio telecommunications phone link. Laramie was the base site from which the instructor could direct all three systems, though students in Rawlins or Douglas could also control the other systems as needed.

The computer-based audiographic system was established because of its potential to be used interactively by participants at all three sites. Two-way audio teleconferencing provided voice interaction while the graphics tablet and keyboard allowed for real-time visual feedback and interaction. Video images which had been previously captured onto the hard disk were mailed to the sites and were called up and used during class. Unfortunately, the transmission of real-time still-frame video images was beyond the capabilities of the system.

As indicated above, instructional support for the course included hardware and materials in addition to the computer-based audiographic delivery system. Print materials, 16mm film, slides, and videotapes were mailed to the two sites where classes were held. A facilitator not enrolled in the course was employed at each class location to oversee the distribution of materials and to help operate the audiographic system. A fax link was established toward the end of the course which enhanced the transmission of printed information, but visuals which were not created by using the computer graphics package, keyboard, or penpad were difficult to transmit. For example, to be able to discuss the collages with students at both sites, students mailed their collages to Laramie where they were videotaped. Video images were then captured onto the hard disks. The hard disks were mailed back to the sites and the information loaded into the computers. During class, student collages could then be called to the screen and the penpad used to circle, underscore, or point to particular areas of the collages.

In addition to the delivery concerns associated with the hardware and other aspects of instructional support, the instructor also had concerns relating to the development of the course. The first was to maintain as much consistency with the on-campus version of the course as possible, a second was to integrate as many *high-touch* opportunities as feasible into a very *high-tech* delivery system, and the the third was to be able to identify and to adjust to any unique preparation and presentation demands presented by the use of the audiographic system.

With a commitment to designing an off-campus course which duplicated the on-campus version in every aspect possible, course goals, objectives, requirements, activities, and grading criteria were identical for the two classes. Though the sequencing of the content was similar, modifications were made in the off-campus schedule to accommodate for logistical problems such as duplicating and mailing information among sites. It would have been feasible to have students at individual sites discuss projects produced at that one location only, but neither the students at other locations nor the instructor could have shared in the dialogue. Though students submitted work and waited up to two weeks before discussing the assignments together, group assessment of projects was desirable.

In attempting to emphasize the interpersonal rather than the hardware aspects of the course, several strategies were used. One strategy was to mail a picture and short biography of the instructor to students so they would have a "face" to go along with the "voice" of the instructor. During early class sessions, students used the graphic capabilities of the system to draw self-portraits or icons which represented themselves, and the collages mentioned above also served to help students introduce themselves to other members of the class. Another concern relating to the human factor involved in the course was how the instructor could provide students with feedback and, conversely, how the instructor could receive feedback from students. During the development of the course, the instructor planned to use the penpad and keyboard as well as the microphones to exchange ideas and provide feedback and believed that students would do the same. The instructor also incorporated several traditional strategies for conducting successful audio classes when developing the course to promote the *high-touch* aspects of the class. But since this visual literacy course was being taught both on- and off-campus for the first time during the 1988 Fall Semester and since the audiographic system itself was untested, other ideas for emphasizing the human aspects of the course as well as strategies for preparing and delivering the class using the audiographic delivery system had to emerge as the semester progressed. Formal and informal evaluations of the course and personal perspectives are related below to reveal some of the successes and frustrations encountered during the semester.

Accomplishments and Caveats

In relation to the instructor's concerns for the development of the course discussed above, on- and off-campus versions of the course were virtually identical in content and similar in sequencing, though delivery varied greatly. Though the instructor did note differences in student's performance in on- and off- campus sections of the class, the instructor does not attribute these perceived differences solely to the delivery system or the course itself but acknowledges other factors which influence distance education.

In regard to the efforts to humanize the technology, a great deal was learned. Strategies summarized above did encourage interpersonal interaction and did help both the students and the instructor remember that real people were actually involved in the extended learning experience. A personal visit by the instructor to each site during the semester might improve the interpersonal climate of the course, though it would require the instructor to travel and would nullify that particular advantage of using the audiographic delivery system.

Though both the audio and the visual capabilities of the system were available, students primarily used the verbal rather than the visual mode to interact with the instructor and with each other. For example, students would describe aspects of visuals rather than pointing to or marking the sections on the computer screen. In retrospect, students indicated a greater familiarity and comfort level with the microphones than they did with the computer, keyboard, and penpad. Though students were familiarized with the computer-based system, in the future the instructor will allow more time for students to learn to use the system and will require that students use the visual communication capabilities of the system more frequently.

In assessing and adjusting to the unique demands of preparing and delivering a course using a computer-based audiographic system, the instructor found that time, flexibility, and energy level were three key factors affecting the success of the course from week to week. Although the development of the course was completed prior to the start of the semester, and although instructional materials were produced and distributed by support personnel, preparing for weekly three-hour sessions was extremely time-consuming. The instructor developed the plans for and requested the production of video images and computer-generated graphics. The instructor also devoted time to learn and to review the operation of the computer-based delivery system. And in addition to the usual amounts of time spent with students enrolled in a class, the instructor spent an even greater deal of time answering questions and talking with individual students on the telephone. Although questions were encouraged during each class session, students felt a need to talk individually with the instructor between classes, perhaps because of the lack of face-to-face contact with the instructor. Though these telephone conversations provided feedback to students, increased the interpersonal aspects of the course, and contributed to the overall success of the course, they also required an unexpected time commitment from the instructor.

Flexibility was required of the instructor in several ways. For example, since all prepared visuals had to be mailed to the sites in advance, no opportunity existed to use visual images which were not contained on the hard disk, unless they could be quickly sketched using the penpad. It was difficult to make spontaneous changes or to provide additional information, especially if visuals were desired, so the instructor had to think of alternative instructional approaches or examples which would work within the constraints of the system. The use of the computer-based audiographic system also required flexibility since various problems with the technologies were often encountered: the computers at one location or another would go down, materials which had been mailed would fail to arrive on time, or the audio transmission would be garbled. Technological quirks demanded flexibility -- and patience -- on the part of both the students and the instructor.

The most unexpected demand upon the instructor was the high degree of energy required to actually teach the course each week. In addition to the traditional efforts associated with delivering instruction, the computer-based audiographic system required the instructor to use the technology effectively as well. The instructor felt that two concurrent levels of functioning were required -- an awareness of the course content and its presentation as well as an ability to manipulate the technologies in order to deliver the information. These activities required not only a great deal of planning, but a great expenditure of energy as well.

In addition to the instructor's initial concerns regarding course delivery and development, other successes and frustrations associated with the course became apparent during the semester. Many of the frustrations had to do with limitations of the delivery system. For example, when the computer-based component of the system was activated, the quality of audio communication was reduced drastically. The quality of images which were captured onto the hard disk was poor. The monitors were too small to be viewed, even by the eight people enrolled at one site. And as mentioned before, the process which enabled the exchange of student visuals was cumbersome and time-intensive.

On the other hand, the computer-based audiographic system did provide an opportunity to offer a course in visual literacy to distanced learners which would not have been possible without the visual/graphic capabilities provided by the computer. The system did enable the exchange of visual information and offered a degree of visual interactivity which was necessary for the course to succeed. As discussed below, many of the technical problems encountered in this first course have already been resolved by the addition of new hardware and software upgrades.

An Introduction to Visual Literacy: The Next Time Around

This paper has described both the content of an introductory course in visual literacy and the technologies which were used to deliver the course to a group of distanced learners. Limitations of the delivery system were noted briefly above, and though current capabilities still do not include the transmission of real-time video images, improvements have been made which will affect the delivery of the course the next time around. Still video images will continue to be sent in advance of the class sessions, but these images will be transmitted by high speed modem instead of on a hard disk sent by ground transportation. Audio and video quality of the signals has been improved, and the system now offers the capability to enlarge and to scan portions of the video images. This latter capability will be used to encourage students to use more visual forms of interaction during class discussions. Other improvements such as larger monitors and increased numbers of monitors will also enhance the delivery of course content.

Changes in the course itself may include a modification in the testing procedures. As part of the test, students were asked to analyze visuals which appeared on the video monitor for the entire group to view. This procedure required some students to wait for others to finish analyzing one visual before another visual was displayed. In seeking other options, it was found that individual photostaic copies of the visuals would not convey color, texture, or other elements of the visuals as well as the video image did. However, the instructor is considering the distribution of several hard-copy original images to each site from which students may individually select images to analyze. Though this procedure will introduce more subjectivity into the testing procedure and will create more work for the instructor, the students will not be forced to wait for their peers when testing.

Another revision which is being considered is to videotape the instructor's presentations and to mail the videotapes to the other sites. Videotapes of on-campus presentations have been used to deliver other off-campus courses, but not in conjunction with the computer-based audiographic system. The use of videotape would add another visual element to the course, though it would be limited to the one-way transmission of visual information.

As mentioned above, the influence of film, video, and MTV as significant visual media in modern society was not addressed as thoroughly as possible in the course. In addition to investigating social and instructional issues associated with film and video, a comparison of the print version (McDermott, 1974) and the film version (McDermott, 1973) of the highly visual tale, Arrow to the Sun, may offer other interesting opportunities for discussion. Additional ideas for and approaches to teaching visual literacy, such as those offered by Robinson et al. (1989), are also sought to enhance this particular course and other courses in visual literacy offered at the college level. This instructor's experience teaching visual literacy using a computer-based audiographic telecommunications system indicates that the principles of visual literacy can be presented using both on- and off-campus delivery systems. Though both obstacles and advantages are inherent in distance education itself, the use of a computer-based audiographic system proved feasible in the delivery of an introductory course in visual literacy which suggests that these and other technologies have increasing potential for delivering similar visually-oriented courses in the future.

References

Bass, Saul. (1968). Why man creates [Film]. Santa Monica, CA: Pyramid Film and Video.

Brody, P. J. (1982). Affecting instructional textbooks through pictures. In D. H. Jonassen (Ed.), Technology of text (pp. 301-316). Englewood Cliffs, NJ: Educational Technology Publications.

Dondis, D. A. (1973). Primer of visual literacy. Cambridge, MA: Massachusetts Institute of Technology Press.

Dwyer, C.A., & Dwyer, F.M. (1988, January). Visualizing instruction: Research prescriptions. Paper presented at the 1988 National Convention of the Association for Educational Communications and Technology, New Orleans.

Dwyer, F. M. (1972). A guide for improving visualization (pp. 1- 19). State College, PA: Learning Services.

Fleming, M. A. , & Levie, W. H. (1978). Instructional message design. Englewood Cliffs, NJ: Educational Technology Publications.

Lacy, Lyn. (1987a). Visual education. Minneapolis, MN: Minneapolis Public Schools.

Lacy, Lyn. (1987b). Visual education [Slide-tape]. Minneapolis,MN: Author.

McDermott, G. (1973). Arrow to the sun [Film]. Chicago, IL: Texture Films, Inc.

McDermott, G. (1974). Arrow to the sun. New York: Viking Press.

Robinson. R., Seels, B., Metallinos, N., Rezabek, L., Dwyer, F., & Considine, D. (1989). Visual literacy courses at the college level: Panel discussion. In R. A. Braden, D. G. Beauchamp, L.W. Miller, & D. M. Moore (Eds.), About visuals: Research, teaching & applications (pp. 357-366). Blacksburg, VA: International Visual Literacy Association.

VISUAL LITERACY OUTREACH POSSIBILITIES

Deborah Curtiss

For several years, at a number of institutions and conferences, I have been offering slide presentations on visual literacy and its central importance to all learning. As this is something that members of IVLA already appreciate, to give those papers at the IVLA conference seemed more like bringing coals to Newcastle than imparting new insights and developments. Upon further reflection, however, it occurred to me that we all might benefit from my making the text and ideas of my "public" lectures available for discussion at both the conference and by publication in the proceedings. Through discourse we all may learn new ways to approach the topic for greater receptivity by educational institutions, and by the general, i.e., non-initiated audience.

What follows is a combination of two papers. The first one, entitled "Visual Literacy: A Liberal Art,"[1] is basically promotional, in which I endeavor to awaken educators to the centrality of visual literacy for all learning and inquiry. The second, called "The Verbal-Visual Connection,"[2] describes a serendipitous discovery I made when teaching at the Community College of Philadelphia in which the analysis of pictures from magazines, enabled students to greatly improve their writing skills.

VISUAL LITERACY: A LIBERAL ART

As one who was educated within the tradition of keen attention to the intellect, and who later became a practicing artist passionately in love with the entire world of visible and visual experience—one who paints in order to express so much that cannot be adequately expressed with words, and so thereby to come to know what I otherwise could not articulate—it stands to reason that I would eventually feel compelled to proffer a synthesis of verbal and visual learning. For thirteen years I taught basic design and color, drawing at all levels, including figure, and advanced painting at the Philadelphia Museum of Art and the University of the Arts College of Art. Inspired by my museum students, I developed an interdisciplinary, experiential-learning course, Visual Awareness, which I taught for five years through the Center for Contemporary Studies at Temple University, and for which I wrote my book, *Introduction to Visual Literacy*.[3]

Both the course and the book were developed to fill a need that I had felt as an art student, and later as an instructor: to demystify visual communication in such a way that would enable others to see as artists see, and to provide an integrated, gestalt-like overview of the world of visual experience. As the course evolved, so did the book, in order to serve as a text for foundation art students and as a reference and guide accessible to all persons who have an interest in visual experience, creators and receivers alike. In the two and a half years that it has been out, I have entered into many illuminating discussions about the concept of visual literacy and, if anything, my appreciation for its scope and importance has grown enormously; to the point where I have come to recognize that visual literacy is central to the vast majority of human experiences and endeavors. (This awareness has been further increased by the recent work of Judy Baca and her Delphi Project in which she has identified 286 aspects that apply to visual literacy.[4]) From ancient times, Western concepts of education have been primarily of and for the intellect. In the 1970s, when emphasis shifted to "relevance" and education of the "whole person", emotion and hedonism were added, with mixed results. Relevance keeps changing with the times; we continuously fumble with emotion, and hedonism has given way to greed. In the confusion that ensued, many standards and values of education were eroded or temporarily lost, resulting in our current state that is popularly known as cultural illiteracy. Missing from learning concepts at all levels, then as well as today, is an appreciation for, and attention to, sensory education. From the time children learn to read, write, and compute, the senses as significant learning tools are, for the most part, ignored, neglected, and left to fend for themselves. When one considers that from birth a child learns almost entirely through instinctive sensory exploration, this sudden neglect and virtual denial of the senses after age six must be recognized as the violent act it is, one that violates essential aspects of our very beingness, our "suchness". One would have hoped that psychologists would have recognized this oversight, but even in perception theory, sensory learning has been more interesting to study than to teach. As we are educated, so we educate, and few are recognizing or taking responsibility for nourishing the fundamental hunger that our young people have for sensory stimulation and integration. Except, that is, for the enterprising media and entertainment moguls who, with a barrage of sound and sight, take advantage of the sensory craving of our youth. Many young people pursue gratification from Saturday morning cartoons, boom boxes, video games and MTV, and instead of nourishment become caught in an addictive thrall that bombards, desensitizes, and rarely educates.

The Problem

Finding fault and placing blame for hapless, blitzed-out, historically and culturally ignorant youngsters is not as much of a challenge as is developing alternatives that will reach them and bring them into the learning fold. Ideational and factual dissemination of information doesn't work, nor do passionate oratorical presentations in which they may continue to be docile and passively entertained. With all the current attention on the failure of education, a significant part of which, I posit, is the ignorance of educators at all levels regarding the importance of sensory learning, there is tremendous pressure to provide students too much in too short a time: remedial skills plus attainment of the knowledge traditionally held to be central to a college education. When the pressure is on, as we all know, it is the arts that suffer. Considered by anyone other than professionals and majors to be expendable, all the arts receive short shrift when it is likely that, presented appropriately, the arts can provide effective and empowering paths toward enhancing learning ability and intelligence.

Meanwhile, we scramble to find ways to engage students through imaginative interdisciplinary and non-traditional courses which may, without grasping the essentiality of educating both sides of the brain integratively, so to instill a synergistic intelligence, be nothing more than stabs in the dark.

Proposal

With so many pressures on core studies, how can I conscionably suggest another slant to basic education? I can do so because the concept of visual literacy recognizes the sense of vision as a primary learning tool, and acknowledges the pervasive presence and importance of visual communication in the technological world today. Visual literacy represents a multidimensional mode of learning that enhances, expands, and reinforces all forms and subjects of inquiry, for it integrates visual thinking with the intellect in a complementary and powerful educational synthesis. It both incorporates and transcends the dialectic, the scientific method, and all models of artificial intelligence being explored today. Cross-over paths, by which visual experience and expression illuminate and inspire verbal experience and expression, are available to the visually literate student, an example provided by the experience I had with community college students described in the second part of this paper. The deconstruction of visual statements to discover the elements and principles of their creation dramatically improved students' written and oral expression, indicating that the act of analyzing visual statements may serve to unlock global, or "right-brain" thinking, and thereby unblock sequential organization, or "left-brain" thinking, that is required for effective verbalization. Due to the constant presence of television in the lives of most young people today, a visuo-spatial influence that may engender right-brain activity, the proportion of right-brain dominant students may well be increasing. A number of my liberal arts colleagues fear that this is the case and admit to being perplexed. Some are resistant to changing their methods, curiously far more often in the humanities than in the sciences, and adamantly insist upon a strict adherence to Western pedagogic and intellectual traditions. Others, admitting that today's students see more quickly and acutely than the teachers themselves, are concerned about how to approach their pupils for more effective knowledge transferral, enhanced critical thinking, and efficacious learning.

It is my position that interaction of the verbal and visual, in which cognition is integrated with perception in such a way to enable students to verbalize what they perceive, to say what they think and feel, and to give visual representation to what they know, should be a commonplace educational experience from birth onward. It is now generally acknowledged that, by stimulating sensory learning, we can and do increase both the capacity and the ability to learn more effectively.[5] Thus visual literacy is relevant to the study of all subjects, not only the visual arts.

All the professions that are commonly held to be on a high plane of intellectual endeavor and expertise—such as education, engineering, government, human services, law, management, medicine, and the sciences—require and entail keen visual perception and thinking. Most people in these professions learn their relevant visual skills by hit-or-miss absorption. Need that be? Visual arts educators, instead of providing what too often appears to be, or is interpreted by the uninitiated as, occupational therapy and recreation, have an opportunity to not only tighten up the teaching of art basics, but to make them both more viable and appreciated by students and educators of all fields and by administrators, too.

What is Visual Literacy?

What, then, is visual literacy? By its nature, it defies exactitude, but in defining it, I and others borrow from the accepted definition of verbal literacy: the ability to speak, read, and write a language. Visual literacy involves an integration of critical viewing with critical thinking such that a visually literate person is one who can identify, analyze, interpret, evaluate, and produce visual messages.[6] Visual literacy is not, therefore, a literal or literary concept; nor is it an attempt to make literature out of visual expression. Rather, by using the model of communication in the process of acquiring visual skills and acumen, art and media students are provided with a strong foundation upon which to create focused and excellent visual statements. With a foundation of visual literacy, art history students can more astutely study the visual statements of the past and present, and the liberal arts student can more intelligently appreciate and utilize not only the visual arts, but the entire visible world in which we live and work.

A course in visual literacy must, by its very nature, be predicated upon the concept of a non-linear clustering of learning activities in each class. It includes a combination of readings, visuals, lectures, discussions, and experiential studio explorations. History and perception, the reception of visual statements, are integrated with visual expression, the active making of visual statements. From the outset, students use word and image interactively to express themselves with modes best suited to their learning capabilities. This reflects that we are a word-centered culture that is not replacing our verbosity with images, but adding images to our rich verbal heritage.

Content/Form In coming to understand visual statements, whether in a museum, at work or home, or on television, one knows that there is a difference between form and content. In most curricula today, learning about visual form takes place primarily in studio art courses, and content study takes place primarily in art history and communications courses. From the perspective of visual literacy, these two basic facets of visual messages are learned and experienced as interactive and synergistic, and as relevant to our being in the world.

The Elements While studying excellent and noteworthy works of art of the past—learning about the meaning, the historical context and significance of the work—the student may perform graphic analyses of magazine pictures in order to learn about and ascertain the use of the visual elements, the alphabet of visual expression. For example, the paintings of Roy Lichtenstein are comprised of the obvious elements of dots, lines, shapes, and colors. They also have light values, visual texture, and implied movement.

Compositional Principles How the elements are combined is the grammar, the compositional principles of visual communication. Students learn to analyze visual statements in the classroom, at galleries, and at home for their underlying designs: orientation, balance, focal points, rhythms, tension, conflict, and resolved unity. For example, the student quoted above discovered that "The Painter's Triumph," by William Sidney Mount[7], often beloved for its accessible narrative expression, has a helter-skelter composition that distracts from, rather than supports, the intended significance of this work. "Pelvis with Moon," by Georgia O'Keeffe[8], that at first glance seemed unbalanced and arbitrary to the student, was discovered to possess an exquisitely choreographed compositional structure. Learning to see in these ways—to see beyond the surface of an image—is one of the most important aspects of becoming visually literate, for it alerts students to hidden communications and empowers them to evaluate more astutely a multitude of life and professional situations.

Style The characteristic ways an artist designs and shapes a visual statement, in which it becomes identifiable as the work of a particular individual, group, region, or period, determines the work's style, and is also a significant part of its content. An exploration of visual examples from history to the present engages students in developing a vocabulary of visual styles. And as they see examples of representation, objective abstraction, and non-representation, or classicism, romanticism, to post-modernism, they can concurrently be required to create simple visual statements that exemplify these qualities. By making these examples—in readily available media, such as drawing, photography, collage, video, or on computers—students gain experiential reinforcement of stylistic, formal, and communication concepts.

Content Interpretation The interpretation of the meaning of visual statements is always relevant. How is the subject, information, story, social function, and intent to be interpreted, both within the historical context in which the work was created, and from the viewpoints both students and scholars hold today? Historians, past and present, have interesting and diverse ways of looking at art and visual communication. Iconographic, connoisseurial, structuralist, social, semiotic, and deconstructionist approaches to experiencing visual statements are all part of a visually literate person's lexicon for interpreting all visual experience. The recognition of hidden intent, persuasion, manipulation, and the ethics of any information embedded in visual expression relies upon the visual literacy of the individual to discern and evaluate. Moreover, social, ethical, and philosophical implications of the transition from aural/oral to verbal to visual modes of communication can be effectively analyzed within the context of the study of content in visual statements.

Visual Expression We would not consider a person fully literate who could read but not write, so a person who only passively appreciates art and visual communications is not fully literate either. There is something profound that happens when the eye, mind, and hand work together and both perceptually and kinesthetically effect the shape and form of a thing. The ability to draw, to take a decent photograph, to arrange objects effectively in space and, increasingly, to use computers and video, are fundamental skills that every educated person should possess. The purpose is not to aspire to make great art or to be artists, any more than the purpose of teaching writing is to create poets. It is time that we, educators and students alike, discharge pretense and resistance and get on with becoming broadly and comfortably visually literate.

Through active creation of visual statements, one comes to perceive and know a wealth about the world in which we live, as well as appreciate the visual statements of others. Exploration of the media options for visual expression provides visual problems to solve with hands-on experience, and an opportunity to develop skills of visual thinking and problem solving that are relevant to many areas of expertise today. In visual problem solving, forces, structures, relevancies, and implications are discovered by obscure and devious routes, paths and methods of thinking incapable of being taught intellectually, ways of knowing that are, incidentally, being increasingly employed in scientific and social research. Moreover, when trendy popularity often reigns as a measure of merit and banality can pass for wisdom, all students need to have the synthetical and interactive tools of visual literacy that enable them to evaluate and take responsibility for the visual statements they support and make. They (and we, I might add) can thus rediscover the richness of the world with an educated and civilized vision, with sensitivity to the visual statements of others, and to the ecology of which we all are a part.

As neither a research educator, scholar, cognitive or perception psychologist, I beg your indulgence for the speculations and positions that I have offered today. I ask that those of you prepared to do further research on the efficacy of visual literacy—its role in education, its function in the acquisition and use of intelligence, and its epistemological implications upon thought and inquiry—accept my challenge to test and verify the conjectures that I have made. In recognition of my own diffidence to undertake such testing, I quote James Joyce who has said,

> The artist. . . remains within or behind or beyond or above his handiwork, invisible, refined out of existence, indifferent, paring his fingernails.[9]

I have the temerity to pare my fingernails in public, motivated by my observation that for generations, visual illiteracy has had significant and unfortunate consequences upon human intelligence, the educational process, and the world in which we live.

We are now, like it or not, irrevocably in the throes of the Iconic Age, in which changes in communications and learning must be addressed by the entire educational community in general, and artists in particular. Like the scribes of the Middle Ages who suddenly found themselves, with the invention of printing, responsible for teaching the masses to read and write, artists—as most trained in visual perception and thinking—should actively respond to the mandate of the proliferation of visual communication by developing and teaching courses that address and integrate visual thinking and expression across the curriculum. Studio artists, art educators and historians, and verbal and visual communicators can develop courses from their own perspectives that focus upon, or incorporate, aspects of visual literacy. Teachers in all disciplines can integrate visual reinforcements into the curriculum. For example, in addition to including slides and films with our lectures, we can encourage students to illustrate written assignments with sketches, photographs, collages or magazine cut-outs. In teaching history, geography, sociology, anthropology, or literature, we can provide guided visualizations in which students are encouraged to imagine themselves in an era or place that is being studied, and thereby provide a powerful learning connection to the material that may otherwise remain remote and of indifference. The study of science, medicine, and the law are replete with opportunities to develop keen visual acumen in the questioning and testing of observations and assumptions. Educators at all levels and disciplines can seek and support the development of the integration of visual learning throughout the curriculum so as to provide tools with which students can experience visual statements and communications, not with gullible passivity, but with critical thinking and seeing, knowledge, imagination, and willing participation.

Because of its multifaceted, interdisciplinary approach, and the broad constituency of students in our classrooms today, the teaching of visual literacy is a fairly personal project. The syllabus that I developed when teaching at Temple University is available upon request, as are other course guides and syllabi through

IVLA.[10] With my book and other books and materials being created by IVLA members, together with one's own teaching experience, I think many will be well equipped to make the power of visual literacy more broadly available.

While the attainment of visual literacy is a life-long quest, having exposure to its scope, and learning its rudiments, should be a basic requirement for every college diploma. As one of my literature colleagues is fond of telling his students, "If you don't master the written word, you are destined to be manipulated and mastered by it." By the same token, as we continue to neglect visual literacy in education at all levels, both we and our students are generously manipulated and mastered by the media of television and advertising. A basic tenet of higher education is critical thinking. Yet, in this iconic age, if we cannot *see* critically, are we really able to *think* critically?

To conclude the first part of this paper, visual literacy is the essence of a liberal art for it is a mode of inquiry and learning that both draws upon and contributes to the quadrivium of the liberal arts:
the physical science of media,
the natural science of invention,
the social interaction and humanism of communication, and
the creativity of the arts.
It unifies and exemplifies liberal arts education by liberating and empowering beyond measure.

The Verbal-Visual Connection

Studio arts teachers frequently state that their students are incapable of talking about what they see and do, and liberal arts teachers complain that art students can't write. This inarticulateness is probably due to a dichotomous split between the activities of verbal and visual expression; a split that has been assumed to be mystifyingly unbreachable in the past, and to a large extent assumed to be justified by the popularized research on the differing activities of the two hemispheres of the forebrain. In this part of the paper I shall describe an experience in which students' writing ability improved dramatically in conjunction with diagrammatic analyses of pictures.

As an artist who came to the visual arts from a typical education slanted toward the verbal, intellectual and analytical, including philosophy, logic and mathematics, it was a great surprise to find myself challenged to really think for the first time, by the color problems of Josef Albers;[11] problems that were more complex and perplexing than any I had previously encountered.

The intuitive, spatial thinking and cogitation procedures of visual problem-solving are, I posit, no less intellectual, nor viable as mentation, than the strictest analytical logic and sequential expression, i.e., writing. Indeed, I think it is far more sophisticated, challenging, and exciting. Discovery of that challenge and excitement, together with my love for the world of visible and visual experience, gave birth to a passionate interest and involvement that has led me along a path, as a painter, of devoted visual exploration, expression, and teaching.

While teaching drawing and painting at Philadelphia Museum of Art and Philadelphia College of Art, I rarely encountered written expression by students, but their inability to articulate visual experience propelled me to design a course in Visual Awareness which I taught at Temple University from 1977 to 1982. I developed the syllabus, and eventually wrote (not knowing of the IVLA) *Introduction to Visual Literacy.*[12] Because of my early education, it was natural for me to include verbal expression, both spoken and written, as an integral part of my visual arts teaching. Most of the students at Temple—from a variety of backgrounds, majors, and ages—possessed a similar comfort in expressing themselves verbally, often more than visually. In 1984, when I had an opportunity to teach a visual communication course at Community College of Philadelphia and use my book in manuscript as the text, I was brought up short when I received the first written assignments from the Community students.

These initial assignments called for writing an evaluation of the student's own visual awareness, of how important visual experience is to him or her (Ch. I, exc. I, p. 243,

180

IVL), and a summary of how they had discovered, through discussions in class, that their personal heritage had affected their visual awareness and preferences (Ch. 17, exc. 1 & 2, p. 246, *IVL*).

I was shocked by inarticulate papers: fractured phrases, garbled sentence structures, and big, irrelevant words, not to mention misspellings. With the most coherent papers, I played English teacher and made corrections. The papers that were so inept as to be meaningless incited me to speak to the writers personally to encourage them to go for help at the writing lab. Few did. I was perplexed as to what to do, but by observing the community college students, and listening to their speech patterns, the way they would talk around a subject, gradually sketching in the total picture, I began to realize that they were thinking and responding in ways similar to art students: grasping generalities and totalities quickly, but having difficulty expressing themselves except through holistic, feeling-oriented means.

A Solution for Increased Literacy Productivity

As I came to appreciate the problem and cast around for a solution, I feared that we might get mired in writing techniques, a subject I felt unqualified to address. So, hoping for the best, we proceeded with the syllabus which, in the fourth week, called for learning to "read" visual statements through doing visual analyses of pictures from magazines. These exercises, in which several pictures are selected for their use of the dot, line, or shape, upon which each of these elements is circled or otherwise indicated, also include a brief written description of how each element is used and functions within its context (*IVL* Ch. 3, exc. 1,2, & 3, p. 243-4). The simple directness of the task did not overwhelm, and the descriptions, while uninspired, were appropriately clear. We proceeded to the location and function of the more complex elements: mass/form, texture, perspective, illusion, movement and time (*IVL* Ch. 3, exc. 4-8, p. 244); and color and value (*IVL* Ch. 4, exc. 1-7, p. 244). With each, the written descriptions became more searching and more articulate.

Deconstruction, used in its literal (rather than post-modernist literary) sense of taking apart a work previously constructed so to examine its constituent elements and principles of construction, entails:

Looking at, acknowledging the totality, of the picture;

Looking for where a particular element, line, for example, is used;

Identifying with arrows, circles, and overlay tracings, each kind of line: straight, diagonal, curved, wavy, sharp, broad (simultaneously learning vocabulary) with a number; and,

Writing, on a separate paper, corresponding numbers with the identification of kind and a description of how each line is used.

Magazine pictures were similarly deconstructed to analyze the underlying structure, the composition and design, of numerous visual statements. Each exercise was demonstrated and worked on in class, as well as in homework assignments. Using several sheets of tracing paper, students would:

Outline the format (critical, as the compositional principles can only be analyzed meaningfully within their specific context);

Diagram within the format the placement of focal points and lines of force;

Diagram to simplified, geometric shapes;

Diagram the orientation, proportion, balance; and

Write descriptions and analyses of how each of the above compositional principles functioned in that particular visual statement; how scale, symmetry, dominance/subordination, repetition/rhythm, contrast/variety/energy, tension/ conflict/resolution, and overall unity are used and achieved.

For example, a student wrote,

> Wow! was I suckered in by this one. Here's this painting, "The Painter's Triumph," by William Sidney Mount[13] that I saw at the [Pennsylvania] Academy of the Fine Arts. It's a small painting, in warm colors and filled with so much happiness and excitement, that it immediately made me feel good all over. But when I took this postcard home and analyzed for the lines of force, the energy, I found it to be jumping all over. That could emphasize the triumph of the artist, the jubilation, which would be really neat, but the longer I looked at it, I felt these

> lines of force to be fighting with each other, going every which way, and in the end, concluded that the painting would have been stronger with less clutter.

This statement may be a bit heavy on the vernacular for a written assignment, but it is undeniably clear and articulate about both specific formal issues and personal response.

About Georgia O'Keeffe's "Pelvis with Moon,"[14] a student wrote,

> What first struck me about this painting is the imbalance of it, and the energy of a dead form, bones. While I love the cool colors, the way the bones go out the upper and left edges, and the narrow point it seems to be standing on, I found to be really disturbing. When I drew the lines of force I felt the grace of each one, and when they were all together, it felt like a dance, like me dancing. I now see the picture in a totally new way.

This may not be syntactically perfect as yet, but for someone who started out by writing, "Dots where showd," she was writing in a totally new way too.

These assignments, each brief, were made for daily execution over a six-week period in the middle of the semester. With each, the students' writing skills improved, growing in both substance and quantity. It seemed that in describing and analyzing, straightforwardly and simply, a specific issue that they would extricate from the totality of the visual statement, something clicked for them. It was as if something got unlocked and unblocked.

Since nothing succeeds like success, we went on to more complex problems, such as descriptions, both oral in class and written at home, of personal visual experiences, and their procedures in solving assigned visual problems. This last task, especially, brought clarity to their writing. Making a visual statement is, in actuality, a sequential process, no matter what the medium. Yet the process is not necessarily a logical one, as goofs inevitably occur along the way. Nevertheless, making a drawing, collage, or photograph seems to provide a linear structure from which writing can flow.

A Speculative Interpretation

There could be many methods that might get the verbal and visual procedures of our minds to work, not in conflict, but in harmonic coordination and for mutual learning enrichment and benefit. Not being in educational research, or a developmental psychologist, I can only speculate. In so doing, I draw upon experience as an artist, my masters' thesis on brain hemispheric studies,[15] my aforementioned book,[16] as well as classroom and studio teaching experiences and observations.

Research into brain hemispheric differences indicates that the two sides of the brain do think differently, although not as separately as some popularizers of the research would have us believe. For most of us, the left side attends predominantly to detail and sequential modes of thinking such as language, and the right side deals with spatial relations and global issues. Persons tend to have dominance of one mode of thinking over the other, a tendency with which we are probably born.

Research demonstrates that most artists are right brain dominant.[17] Artists and art students are fortunate in that we have found an activity where our primary mode of thinking is effective, if not always acknowledged and appreciated. But there are many others who are right-brain dominant who suffer tremendously in an educational system that favors, almost exclusively, left-brain thinking. Marshall McLuhan not only attributed most illiteracy to right-brain dominance, but identified illiteracy as a significant factor in crime.[18] As with most art students, many community college students may be right-brain dominant; and while they have become sufficiently literate to graduate from high school, chronic stumbling through the thicket of global thinking may be what has prevented them from higher educational achievement and admission to more competitive colleges.

In a scenario probably familiar to liberal arts and academic teachers in art schools, right-brain dominant students, when presented with a seemingly simple writing request, such as, "Write something about your life," typically and immediately see the whole issue, its totality, their entire life as one great big in-

IVL), and a summary of how they had discovered, through discussions in class, that their personal heritage had affected their visual awareness and preferences (Ch. 17, exc. 1 & 2, p. 246, *IVL*).

I was shocked by inarticulate papers: fractured phrases, garbled sentence structures, and big, irrelevant words, not to mention misspellings. With the most coherent papers, I played English teacher and made corrections. The papers that were so inept as to be meaningless incited me to speak to the writers personally to encourage them to go for help at the writing lab. Few did. I was perplexed as to what to do, but by observing the community college students, and listening to their speech patterns, the way they would talk around a subject, gradually sketching in the total picture, I began to realize that they were thinking and responding in ways similar to art students: grasping generalities and totalities quickly, but having difficulty expressing themselves except through holistic, feeling-oriented means.

A Solution for Increased Literacy Productivity

As I came to appreciate the problem and cast around for a solution, I feared that we might get mired in writing techniques, a subject I felt unqualified to address. So, hoping for the best, we proceeded with the syllabus which, in the fourth week, called for learning to "read" visual statements through doing visual analyses of pictures from magazines. These exercises, in which several pictures are selected for their use of the dot, line, or shape, upon which each of these elements is circled or otherwise indicated, also include a brief written description of how each element is used and functions within its context (*IVL* Ch. 3, exc. 1,2, & 3, p. 243-4). The simple directness of the task did not overwhelm, and the descriptions, while uninspired, were appropriately clear. We proceeded to the location and function of the more complex elements: mass/form, texture, perspective, illusion, movement and time (*IVL* Ch. 3, exc. 4-8, p. 244); and color and value (*IVL* Ch. 4, exc. 1-7, p. 244). With each, the written descriptions became more searching and more articulate.

Deconstruction, used in its literal (rather than post-modernist literary) sense of taking apart a work previously constructed so to examine its constituent elements and principles of construction, entails:

Looking at, acknowledging the totality, of the picture;

Looking for where a particular element, line, for example, is used;

Identifying with arrows, circles, and overlay tracings, each kind of line: straight, diagonal, curved, wavy, sharp, broad (simultaneously learning vocabulary) with a number; and,

Writing, on a separate paper, corresponding numbers with the identification of kind and a description of how each line is used.

Magazine pictures were similarly deconstructed to analyze the underlying structure, the composition and design, of numerous visual statements. Each exercise was demonstrated and worked on in class, as well as in homework assignments. Using several sheets of tracing paper, students would:

Outline the format (critical, as the compositional principles can only be analyzed meaningfully within their specific context);

Diagram within the format the placement of focal points and lines of force;

Diagram to simplified, geometric shapes;

Diagram the orientation, proportion, balance; and

Write descriptions and analyses of how each of the above compositional principles functioned in that particular visual statement; how scale, symmetry, dominance/subordination, repetition/rhythm, contrast/variety/energy, tension/ conflict/resolution, and overall unity are used and achieved.

For example, a student wrote,

> Wow! was I suckered in by this one. Here's this painting, "The Painter's Triumph," by William Sidney Mount[13] that I saw at the [Pennsylvania] Academy of the Fine Arts. It's a small painting, in warm colors and filled with so much happiness and excitement, that it immediately made me feel good all over. But when I took this postcard home and analyzed for the lines of force, the energy, I found it to be jumping all over. That could emphasize the triumph of the artist, the jubilation, which would be really neat, but the longer I looked at it, I felt these

> lines of force to be fighting with each other, going every which way, and in the end, concluded that the painting would have been stronger with less clutter.

This statement may be a bit heavy on the vernacular for a written assignment, but it is undeniably clear and articulate about both specific formal issues and personal response.

About Georgia O'Keeffe's "Pelvis with Moon,"[14] a student wrote,

> What first struck me about this painting is the imbalance of it, and the energy of a dead form, bones. While I love the cool colors, the way the bones go out the upper and left edges, and the narrow point it seems to be standing on, I found to be really disturbing. When I drew the lines of force I felt the grace of each one, and when they were all together, it felt like a dance, like me dancing. I now see the picture in a totally new way.

This may not be syntactically perfect as yet, but for someone who started out by writing, "Dots where showd," she was writing in a totally new way too.

These assignments, each brief, were made for daily execution over a six-week period in the middle of the semester. With each, the students' writing skills improved, growing in both substance and quantity. It seemed that in describing and analyzing, straightforwardly and simply, a specific issue that they would extricate from the totality of the visual statement, something clicked for them. It was as if something got unlocked and unblocked.

Since nothing succeeds like success, we went on to more complex problems, such as descriptions, both oral in class and written at home, of personal visual experiences, and their procedures in solving assigned visual problems. This last task, especially, brought clarity to their writing. Making a visual statement is, in actuality, a sequential process, no matter what the medium. Yet the process is not necessarily a logical one, as goofs inevitably occur along the way. Nevertheless, making a drawing, collage, or photograph seems to provide a linear structure from which writing can flow.

A Speculative Interpretation

There could be many methods that might get the verbal and visual procedures of our minds to work, not in conflict, but in harmonic coordination and for mutual learning enrichment and benefit. Not being in educational research, or a developmental psychologist, I can only speculate. In so doing, I draw upon experience as an artist, my masters' thesis on brain hemispheric studies,[15] my aforementioned book,[16] as well as classroom and studio teaching experiences and observations.

Research into brain hemispheric differences indicates that the two sides of the brain do think differently, although not as separately as some popularizers of the research would have us believe. For most of us, the left side attends predominantly to detail and sequential modes of thinking such as language, and the right side deals with spatial relations and global issues. Persons tend to have dominance of one mode of thinking over the other, a tendency with which we are probably born.

Research demonstrates that most artists are right brain dominant.[17] Artists and art students are fortunate in that we have found an activity where our primary mode of thinking is effective, if not always acknowledged and appreciated. But there are many others who are right-brain dominant who suffer tremendously in an educational system that favors, almost exclusively, left-brain thinking. Marshall McLuhan not only attributed most illiteracy to right-brain dominance, but identified illiteracy as a significant factor in crime.[18] As with most art students, many community college students may be right-brain dominant; and while they have become sufficiently literate to graduate from high school, chronic stumbling through the thicket of global thinking may be what has prevented them from higher educational achievement and admission to more competitive colleges.

In a scenario probably familiar to liberal arts and academic teachers in art schools, right-brain dominant students, when presented with a seemingly simple writing request, such as, "Write something about your life," typically and immediately see the whole issue, its totality, their entire life as one great big inscrutable glob. They are overwhelmed by the topic, the enormity of choices, as well as by a huge, disorganized vocabulary. At a loss as to how or where to begin, panic may set in, and, to the student, the glob seems insurmountable. Their thinking systems shut down, and the failure track, probably already over-stimulated by similar pre-college frustrations, is perpetuated. No matter how hard we try to give cues for writing well, such as lists of steps or outlines, these students may grope and trudge but rarely break through to effective and efficacious writing.

Other Approaches

As I shared some of the occurrences and observations of my students' writing growth with my colleagues, I learned that an English teacher was using drawing assignments to get impressive writing from her students, non-art majors as well as artists. She first asked them to write about a relatively common fruit of their choice. The writing was abysmal: stiff, factual, lacking in color or imagination. She requested that they bring the fruit, about which they had written, to the next class. Then, instead of writing about it, she asked them to draw it. After the drawings—during which the fruits were cut open, and drawn some more, and smelled, and tasted as well—they were again asked to write about their fruit, and the words flowed freely, copiously and, most of all, creatively. This instructor had engaged students' visual and sensory faculties as active participants in the writing process, as contrasted with the more common passive observational mode, and found that it had a profound effect upon writing, imagination, and creativity.

Similarly, writing teachers in art schools have found imaginative and creative ways to link the art-making procedures of their students with the compositional process of writing, and art critiques of their own work with thinking and writing critically. When done well, there is no compromise of the writing or verbal skills we hope to instill, for such connections enable art students to utilize their dominant thinking modes for strengthening their weaker, verbal skills. Getting the verbal and visual to connect is mutually reinforcing and empowering for the student.

The ultimate test of success was part of the final exam requirement, a thorough analysis, with both written and visual components, of a visual statement selected by the student (*IVL* Ch. 16, exc. 7, p. 246). Their choices included craft objects, paintings, sculptures, buildings, rooms, parks, films, television programs, clothing outfits, and so forth, and concluded with an overall written evaluation of the effectiveness of the visual statement. While volumes might have been written about some of the objects chosen, the majority of students were able to write concisely about the highpoints and basic characteristics.

Merging Literacy Approaches

It is tragic that so few educators appreciate the power of visual thinking in particular, and sensory learning in general, so to use resources already available. Today, when communications are increasingly visual, it is ridiculous to try to keep the two principle modes of thinking, learning, and communicating, the verbal and visual, on conflicting or parallel, non-intersecting tracks. Liberal arts teachers in the art school environment are in an excellent position to discover paths by which verbal and visual literacy can be brought together so as to be cross-fertilizing and mutually beneficial. This synergistic process restores vision as a primary tool for information-gathering, experience, and retention, and incites development of articulate written and oral expression.

Attempting to reach students through their primary mode of expression is only a first step. I encourage the testing of my hypothesis that the deconstruction of visual statements, as described above, is a key to unlocking global thinking and provides a process for writing more adequately. As a visual artist now painting and writing full-time, I cannot test this myself, but any way that visual learning can be restored to its fundamental and rightful place as central to all education, I am pleased to advocate.

---

[1] Also published: "Visual Literacy: A Liberal Art," *Perspectives*, Journal of the Association of General and Liberal Studies, Bruce Busby, editor, (Columbus, OH Ohio Dominican 19:2, 1989).

---

[2] A version of this paper has been published: "Deconstructing Visual Statements to Improve Written and Oral Expression," in *Journal of Reading Psychology*, Richard Sinatra, editor, (New York: Hemisphere 9:4, 1988).

[3] Curtiss, Deborah: *Introduction to Visual Literacy, A Guide to the Visual Arts and Communication*, (Englewood Cliffs, NJ, Prentice-Hall, 1987).

[4] Baca, Judy Clark: The Delphi Project, graduate study in educational technology at East Texas State University, Commerce TX.

[5] McLuhan, Marshall: "The TV Generation Comes of Age," audio tape, (Baltimore, MD, Johns Hopkins U., 1977) on which he attributed most illiteracy to right-brain dominance and its oversight by educators.

[6] Definition attributed to John L. Debes, founder of the International Visual Literacy Association, 1968.

[7] Curtiss, *op.cit.*, see p. 57 for illustration of painting and diagrams.

[8] *Ibid.*, see p. 56.

[9] Joyce, James, *A Portrait of the Artist as a Young Man*, 1916.

[10] International Visual Literacy Association (c/o Alice D. Walker, Educational Technologies, Virginia Tech, Blacksburg, VA 24061).

[11] Albers, J. *Interaction of Color*. (New Haven, CT, Yale, 1961; 1975).

[12] Curtiss: *Op.cit.*

[13] See footnote 7.

[14] See footnote 8.

[15] Curtiss, Deborah: "Contemporary Research in Brain Hemispheric Specialization for Artists and Art Educators, An Annotated Bibliography." Masters' Thesis, University of the Arts (Bethesda, MD, Educational Resources Information Center, (ED 288768) 1987).

[16] Curtiss: *Op.cit.*

[17] Hanson, J.R., H. Silver, & R. Strong: "Learning Styles and Strategies," (Moorestown, NJ, Hanson Silver Strong & Associates, 1980).

[18] McLuhan, Marshall: "Op.cit."

THE STRUCTURED WRITING TECHNIQUE OF VISUALLY ORGANIZING CONTENT: ITS ROOTS AND FRUITS

J. Alan Whiteside
Mary F. Whiteside
Robert E. Griffin

Introduction

The structure and layout of text for print-based instructional materials have become important issues for both instructors and instructional designers. The combined influence of two primary factors has vaulted the issue of text design to a place of importance: (1) the ease of producing materials that rival the layout and design flexibility of commercial publishers and (2) a growing body of research related to the use of text structure and layout to improve learning.

With the advent of low-cost laser printers and the proliferation of desktop publishing (DTP) software programs, many people are producing "laser quality" output. Whereas teachers once relied on typewritten or even hand-written handouts duplicated with the "ditto" machine, a few minutes in front of a microcomputer attached to a laser printer can lead to materials that appear to have been typeset. Course authors and instructional designers, who once had to have their training materials typeset and printed, can now produce complicated layouts with a variety of typographical features using an in-house DTP system.

A variety of research now exists in which components of page layout and design were investigated to determine their contribution to increasing learners' comprehension and retention. Other relevant research relates specifically to how text information is stored and retrieved from a learner's mind. The results of combining these research efforts provide a basis for identifying guiding principles for those who are involved in the design and production of instructional print materials.

Purpose

The purpose of this paper is to recommend the use of structured writing as a technique for preparing print-based instructional materials. Many instructors and most training consultants now have access to the necessary hardware and software to implement this approach, which is well-supported by research as having instructional effectiveness. The origin or "roots" of structured writing will form the backdrop for examples ("fruits") of how the technique can be implemented to facilitate the varied purposes of written communication.

The Roots: Definition of Structured Writing

Many terms are used to describe the techniques employed in text design. One that is used most often is "Information Mapping." The "Information Mapping" approach to structured writing was developed by Robert E. Horn, based on research that began in 1965. Horn reports that his research was initiated as an attempt to improve programmed instruction. Horn noted that learners had difficulty using programmed instructional texts as references, and they were sometimes unable to identify what they needed to learn (Horn, 1982).

Since the phrase, "Information Mapping," is a registered trademark of Information Resources, Inc., several generic terms have been suggested. These include: "information simplification," "infostruct," "mapping," "the technology of text," and "structured writing." Structured writing is the term that seems to describe most accurately the technique of formulating, designing, and writing text to improve comprehension and retention.

As defined by Romiszowski (1986), structured writing is a technique for identifying, categorizing, and interrelating information. According to Horn, structured writing applies the rules of good communication by transforming them into a set of information-display rules. Features of structured writing (based on Horn's "Information Mapping" techniques) include titling, subtitling, and cross-referencing information blocks to facilitate understanding and retrieval (Romiszowski, 1986).

Early Formulations of Structured Writing

As an early researcher in the field of structured writing, Horn proposed very specific and detailed principles for structuring written communication. The "Information Mapping" technique, as implemented by Robert Horn and Information Resources, Inc., is a highly specialized, proprietary technique. This writing method uses blocks instead of paragraphs as the basic organizing unit of a written communication. A block is one or more sentences about a single topic. Each block has an associated label that describes the contents of the block. A block is part of a map; maps are collections of all blocks about a topic. Transitions and other connecting devices are not used; instead, horizontal lines are drawn to divide blocks.

Information Resources, Inc. has developed detailed standards for the content and size of blocks and maps and for their associated labels. Seven principles that support the "Information Mapping" writing method are taught. These principles are: (1) chunking, (2) relevance, (3) labeling, (4) hierarchy of chunking and labeling, (5) consistency, (6) integrated writing-graphics, and (7) accessible detail. In addition to teaching the seven principles, the "Information Mapping" workshops teach standards for sentence structure, choice of words, blocks, types of maps, and document formats.

Research Supporting the "Information Mapping" Techniques

Horn (1982) cites five research studies that evaluated structured writing in instructional settings. These studies that compared structured writing with conventional writing are summarized below.

- Romiszowski (1977) conducted research with high school adult learners and found that subjects learned significantly more mathematics in less time when using instructional materials developed with the structured writing approach.

- Stuart (1979) investigated the use of structured writing with university students. His results indicated that structured writing: (1) resulted in better test performance, and (2) was preferred for readability, understandability, and acceptability.

Research Supporting the "Information Mapping" Techniques (continued)

- Webber (1979) investigated the use of structured writing with clerical workers. He found that training time was reduced by fifty percent and that subjects performed nearly twice as well on criterion tests.
- Soyster (1980) found that high school students (ranging from low to high mental ability) achieved significantly higher levels of learning when using instructional materials that were structurally written.
- Stelnicki's (1980) research was conducted with undergraduate college students. He found that structured writing produced: (1) higher gain scores for facts and (2) higher gain scores for learning concepts.

Limitations of the "Information Mapping" Technique

The specific "Information Mapping" method is an effective technique for organizing and writing specific types of materials; it can be effective for writing procedures and policies. However, since it is a highly specialized technique, if it is rigidly applied, it cannot be easily or effectively utilized for many types of instructional materials. Additionally, "Information Mapping" is proprietary; the materials are available only to those who attend the workshops presented by Information Resources, Inc. Therefore, the techniques and standards are not readily available to a wide population of educators and trainers.

General Support for the Techniques of Structured Writing

Even as Horn pursued his research, a body of literature was being produced by practitioners and researchers from various specialties within the field of instruction. Although these recommendations have come from individuals with differing points of view, strong support for the principles of structured writing has been gathered. These authors have investigated the design and organization of text as tools for increasing a learner's ability to understand and retain textual information.

Example of Support for Structured Writing

Balan (1989) refers to the cognitive processes that a reader has to perform before beginning to learn new material as processing overhead. Examples of these processes include identifying main ideas, organizing, integrating, and elaborating these ideas. Balan (1989, 13) suggests that, "Properly structured text can reduce processing overhead so the reader can concentrate on learning the new material." She recommends three areas of text design--text structure, verbal cuing, and typographical cuing--that can be used to facilitate instruction.

General Literature Categories

The literature related to the design and organization of text can be divided into two large categories: (1) internal textual structuring and (2) external textual structuring (Jonassen, 1982).

Internal Textual Structuring

Internal structuring refers to the techniques used to organize, sequence, and provide an internal framework for helping learners understand the content presented in prose passages. Examples of internal structuring techniques include introductions, topic sentences, transitions, and summaries. Authors who have focused on this category include Kintsch and Van Dijk (1978), Melton (1967), Merrill, Wilson, and Kelety (1979), and Shavelson (1972).

According to Pace (1982), research cannot yet identify precise prescriptions for structuring instructional text. However, she states that several factors should be considered: (1) whenever possible, writers should use techniques to emphasize important information; (2) writers should develop a clear conception of the audience of the text; (3) the theme of each paragraph or section should be clearly stated at its outset; (4) the overall organization of paragraphs should indicate the relative importance of the ideas; (5) the subject of a sentence should reflect information previously presented and lead to new information; (6) the amount of new information presented in one sentence should be limited; and (7) words and phrases that increase the cohesiveness of the text should be used.

External Textual Structuring

External techniques for structuring text precisely indicate the content structure without technically being part of the text. These techniques include linguistic, spatial, and typographic cues that indicate the organization, sequence, function, and importance of content segments. These are usually cues that are added to the prose. Waller and Showstack use the term "discourse punctuators" (Jonassen and Kirschner, 1982). The rationale for using such techniques is provided by research supporting learners' need for organization. Merrill and Stolurow (1966) showed that learners performed better after having a hierarchically organized summary before a lesson. Kallison (1986) found similar results. Students for whom the organization of the lesson had been explicitly displayed scored better on a posttest than learners who did not have this assistance.

External techniques include using blocked text, italicized or bold text, and diagramming or outlining important points. Text characteristics can be used to facilitate learning or the recall of information by typographically indicating the structure of a textual passage (Waller, 1982) and by controlling the learner's mental processing of the textual material. The latter technique refers to mathemagenic aids included in the text or as an adjunct to the text, such as inserted questions (Anderson and Biddle, 1975; Hamaker and Kirschner, 1981; Rickards, 1977, 1980; Rothkopf, 1965), behavioral objectives (Duchastel, 1979; Duell, 1974; Hartley and Davies, 1976), and advance organizers (Ausubel, 1960; Hartley and Davies, 1976). Other techniques, such as the use of organizing word-visuals (Whiteside and Whiteside, 1988) and outline graphics (Braden, 1982) have been recommended as ways of using verbal elements to visually represent the structure of printed materials.

In other words, certain external text characteristics affect the accessibility of instructional text, and other external characteristics affect the motivational perception or the attentional perception of the instructional text (Jonassen and Kirschner, 1982).

Research Support for Structured Writing

Numerous studies have investigated the effectiveness of specific components of structured writing. For example, Meyer (1982) reported that research indicates communication is more efficient and effective if it follows a plan instead of being a miscellaneous sequence of sentences or paragraphs (Frase, 1969; Mandler and Johnson, 1977; Stein and Nezworski, 1978; Thompson, 1960; Thorndyke, 1977). Armbruster and Anderson (1982) conclude that research indicates that structure makes a difference in textual learning (Goetz and Armbruster, 1980; Meyer, 1979; Shimmerlik, 1978). Several studies specify that organized subject material is more easily retrieved from a learner's mind than disorganized or scrambled material (Craik and Tulving, 1975; DiVesta, Schultz and Danzel, 1973; Tulving and Thomson, 1971).

In their chapters in Jonassen's book, The Technology of Text (1982), Duchastel, Hartley, Waller, and Showstack discuss research and the use of textual display techniques for improving learning. Gropper (1988) has shown that information can be more effective and efficient if the reader knows how to process the text by the visual layout of the page. Hartley (1984) has shown that vertical and horizontal spacing can affect recall and comprehension of text. James Hartley (1982) and Shawn Glynn (Glynn, Britton and Tillman, 1982) have contributed several studies that report on the use of typographical or external cues to increase the effectiveness of instructional text.

In order to be as effective as possible, structured writing should embody the techniques for aiding learners' comprehension and retention that have been identified by the research and recommendations from specialists in the field. In other words, the structured writing format should incorporate into instructional materials the internal and external structuring techniques that enable a reader to more easily and effectively process the text. Since learning is an active (not a reactive) process (Hydén, 1977), this means that textual material should be designed to actively engage the learner in the learning process.

The Fruits:
Examples of Structured Writing Techniques

Since structured writing really is clear writing, each writing effort should begin with a careful analysis of the audience (or learner) and an identification of the goal or intent of the communication. The techniques of internal structuring should be incorporated into every piece of written communication, whether or not it takes the form of structured writing. Of more interest to practitioners seeking insights into visual literacy are the external textual structuring techniques.

Examples:
Linguistic Cues

Objectives:
Whether stated in strict behavioral terms or not, objectives can provide the learner with an idea of the specific nature of the knowledge and skills to be gained from the instruction.

Pre-/Post-Questions:
Well-stated adjunct questions can link current material to what the learner already knows, stimulate thinking, and provide problem-solving opportunities.

Advance Organizers:
Advance organizers (narrative material at a higher level of abstraction than the text) provide a context for the instruction and a way for the learner to bridge the gap between existing and new knowledge.

Organizational Word-Visuals and Outline Graphics:
These types of word-visuals specify the organizational structure of a passage using words which, by their placement and design, visually depict the structure of textual material to follow. The major purpose of organizational word-visuals is to keep the learner aware of the context of the material being presented. However, these word-visuals need not be limited to simply showing the outline of the instruction. In fact, Braden (1982) has provided examples of outline graphics being used to depict a process and present behavioral objectives.

Other Linguistic Cues:
Such things as summaries and subheadings can also be used to help the learner correctly assimilate new information for easier retrieval.

Examples:
Spatial Cues

Spacing:
Providing "white space" around and between portions of the text provides cues to the learners that a new section or new type of activity follows. Spacing between elements of the text and horizontal margins for similar elements should be kept consistent to aid the learner in rapidly identifying what follows. For instance, having all lists within the text indented the same amount provides a quick, visual cue to the learner that this component is a list of discrete items.

Page Layout:
The appearance of elements on the page can provide powerful cues to the learner. If a process is being represented, the steps should be arranged to facilitate easy comprehension. If a job aid is being presented as a decision table, allowing a larger area of the page for more likely circumstances can help the learner move quickly to the required section of the job aid.

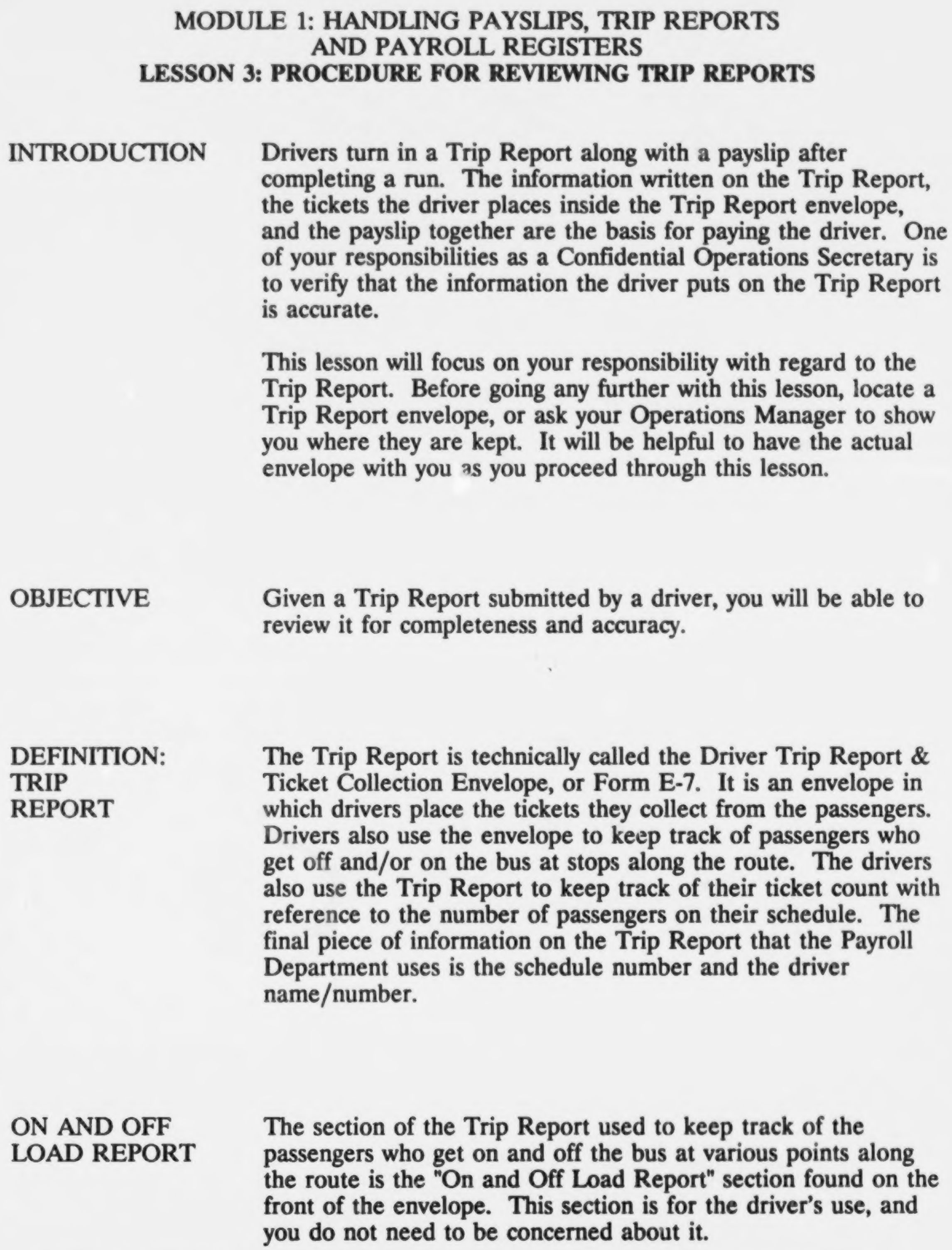
Examples:
Typographical Cues

Bold, Blocked, Underlined, and Italicized Text:
These typographical techniques, used consistently, can alert learners to such things as main ideas; important concepts, rules, quotations, or summaries; titles of resource materials; and subsections of the material.

Type Styles, Sizes, and Fonts:
A change in type style (serif, sans serif, display), size (usually referred to by height or point size), and/or font (typeface, such as Helvetica or Bookman) can signal a change of purpose, new section, or degree of importance. Multiple type styles on a page tend to be confusing rather than facilitating in effect, however.

The Fruits:
Examples of Structured Writing Applications

Structured writing techniques have been used most widely for business communications and training materials. However, advertisements, textbooks, and magazine articles have also used the technique. Not all of the external textual structuring techniques need to be employed in a given piece of print material. Techniques must be chosen to match the application. Several samples of structured writing follow.



MODULE 1: HANDLING PAYSLIPS, TRIP REPORTS AND PAYROLL REGISTERS

LESSON 3: PROCEDURE FOR REVIEWING TRIP REPORTS

INTRODUCTION

Drivers turn in a Trip Report along with a payslip after completing a run. The information written on the Trip Report, the tickets the driver places inside the Trip Report envelope, and the payslip together are the basis for paying the driver. One of your responsibilities as a Confidential Operations Secretary is to verify that the information the driver puts on the Trip Report is accurate.

This lesson will focus on your responsibility with regard to the Trip Report. Before going any further with this lesson, locate a Trip Report envelope, or ask your Operations Manager to show you where they are kept. It will be helpful to have the actual envelope with you as you proceed through this lesson.

OBJECTIVE

Given a Trip Report submitted by a driver, you will be able to review it for completeness and accuracy.

DEFINITION:
TRIP
REPORT

The Trip Report is technically called the Driver Trip Report & Ticket Collection Envelope, or Form E-7. It is an envelope in which drivers place the tickets they collect from the passengers. Drivers also use the envelope to keep track of passengers who get off and/or on the bus at stops along the route. The drivers also use the Trip Report to keep track of their ticket count with reference to the number of passengers on their schedule. The final piece of information on the Trip Report that the Payroll Department uses is the schedule number and the driver name/number.

ON AND OFF
LOAD REPORT

The section of the Trip Report used to keep track of the passengers who get on and off the bus at various points along the route is the "On and Off Load Report" section found on the front of the envelope. This section is for the driver's use, and you do not need to be concerned about it.

Figure 1: First page of a self-paced lesson. Demonstrates the use of spatial cues (blocks of text with labels) and typographic cues (caps, bold). Three types of block labels used: subject matter independent, subject matter, and combination. Note the lack of horizontal lines between blocks to save space in a multi-volume course.

PASSENGER TICKET COUNT

Inside the envelope are two pockets for the drivers to put their tickets in. They keep written track of passengers, tickets and cash fares in the section labeled "Passenger Ticket Count." Again, this section is for the drivers' use, and you do not need to be concerned about it.

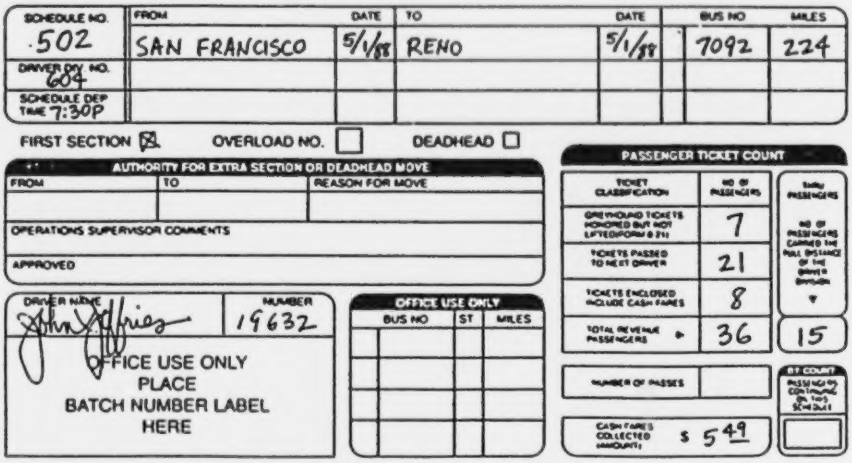
SCHEDULE INFORMATION

Just above the section labeled "Passenger Ticket Count" is the section where the schedule information is to be placed. Locate this section on the inside page of the sample Trip Report shown below. Drivers should complete this information:

- schedule number
- driver division number
- scheduled departure time
- origin and destination of the schedule
- bus or vehicle number
- date
- the number of miles from the origin to the destination

The driver also should sign the form and enter his or her badge number at the bottom.

EXAMPLE: REGULAR RUN TRIP REPORT



SCHEDULE NO.	FROM	DATE	TO	DATE		BUS NO	MILES
502	SAN FRANCISCO	5/1/88	RENO	5/1/88		7092	224
DRIVER DIV. NO. 604							
SCHEDULE DEP TIME 7:30P							

FIRST SECTION ☒ OVERLOAD NO. ☐ DEADHEAD ☐

AUTHORITY FOR EXTRA SECTION OR DEADHEAD MOVE

FROM	TO	REASON FOR MOVE

OPERATIONS SUPERVISOR COMMENTS

APPROVED

DRIVER NAME	NUMBER
John Jeffries	19632

OFFICE USE ONLY
PLACE
BATCH NUMBER LABEL
HERE

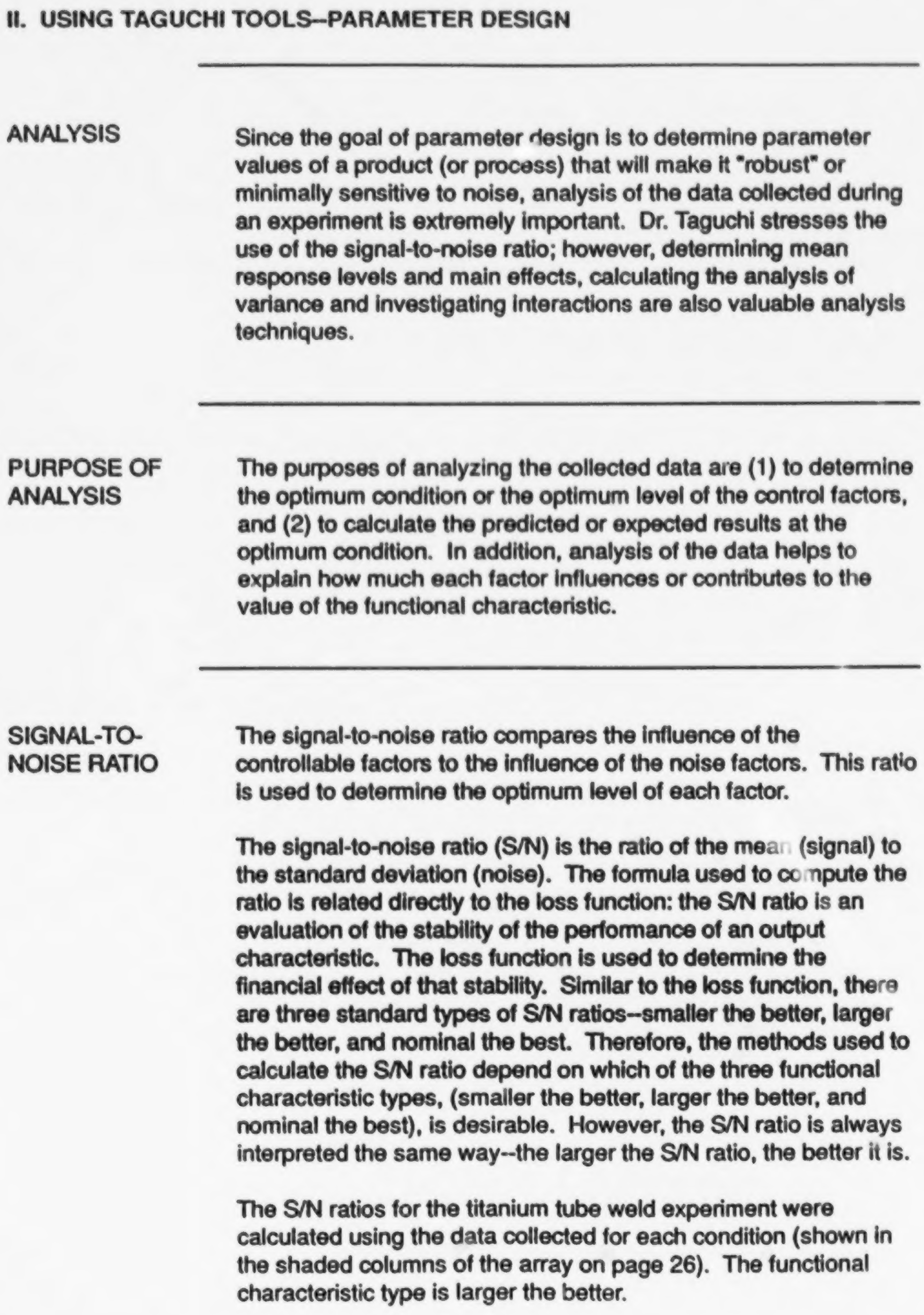
OFFICE USE ONLY

BUS NO		ST	MILES

PASSENGER TICKET COUNT

TICKET CLASSIFICATION	NO OF PASSENGERS	THRU PASSENGERS
GREYHOUND TICKETS HONORED BUT NOT LIFTED (FORM 8 311)	7	NO OF PASSENGERS CARRIED THE FULL DISTANCE OF THE DRIVER DIVISION ▼
TICKETS PASSED TO NEXT DRIVER	21	
TICKETS ENCLOSED INCLUDE CASH FARES	8	
TOTAL REVENUE PASSENGERS ▶	36	15
NUMBER OF PASSES		BY COUNT PASSENGERS CONTINUING ON THIS SCHEDULE
CASH FARES COLLECTED (AMOUNT)	$ 5 49	

Figure 2: Page two of lesson from Figure 1. Bulleted list incorporates spatial and typographic cues. Linguistic cues provided by header (for orientation). Includes illustration within blocked text. Subject-matter and combination block labels.



II. USING TAGUCHI TOOLS--PARAMETER DESIGN

ANALYSIS

Since the goal of parameter design is to determine parameter values of a product (or process) that will make it "robust" or minimally sensitive to noise, analysis of the data collected during an experiment is extremely important. Dr. Taguchi stresses the use of the signal-to-noise ratio; however, determining mean response levels and main effects, calculating the analysis of variance and investigating interactions are also valuable analysis techniques.

PURPOSE OF ANALYSIS

The purposes of analyzing the collected data are (1) to determine the optimum condition or the optimum level of the control factors, and (2) to calculate the predicted or expected results at the optimum condition. In addition, analysis of the data helps to explain how much each factor influences or contributes to the value of the functional characteristic.

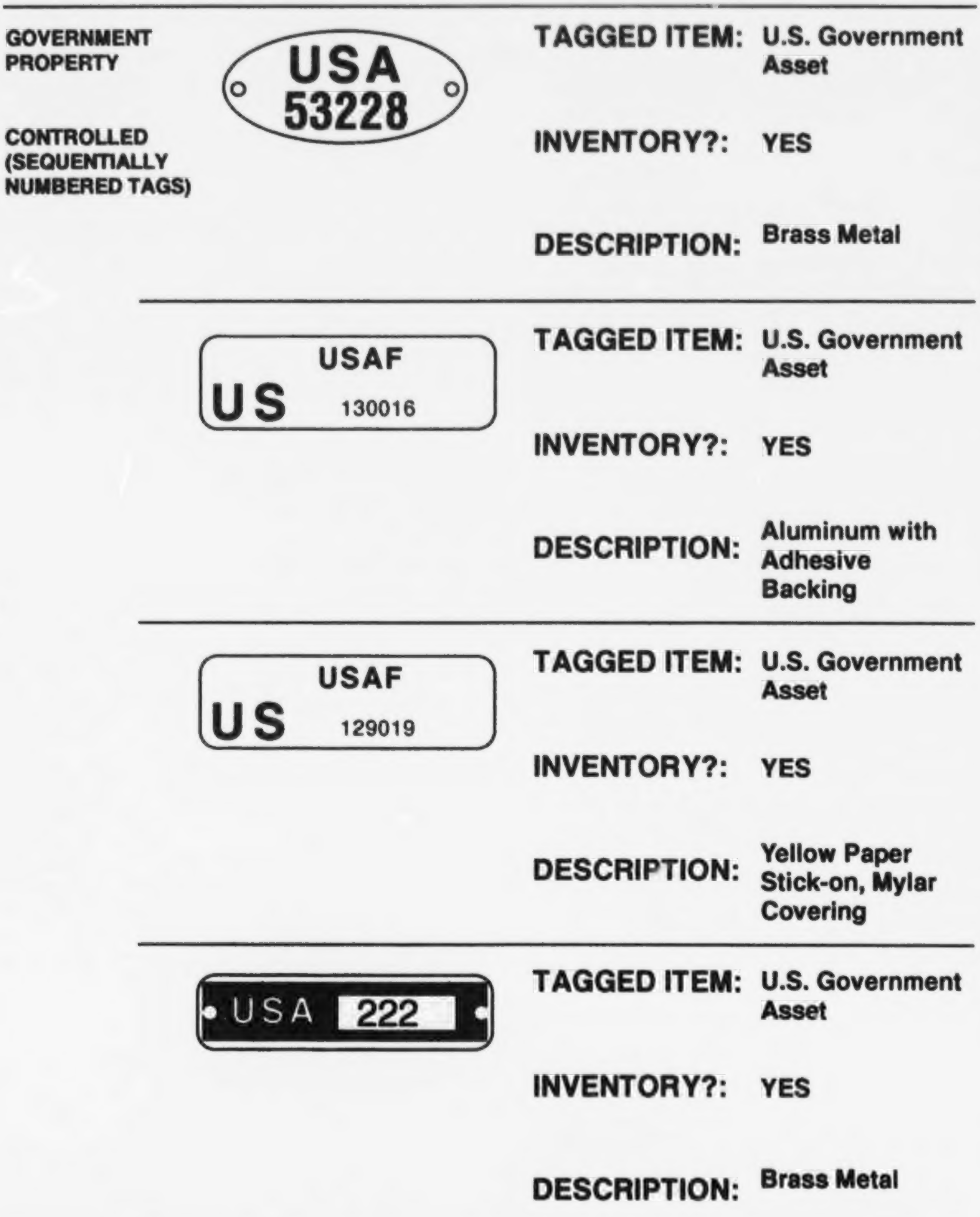
SIGNAL-TO-NOISE RATIO

The signal-to-noise ratio compares the influence of the controllable factors to the influence of the noise factors. This ratio is used to determine the optimum level of each factor.

The signal-to-noise ratio (S/N) is the ratio of the mean (signal) to the standard deviation (noise). The formula used to compute the ratio is related directly to the loss function: the S/N ratio is an evaluation of the stability of the performance of an output characteristic. The loss function is used to determine the financial effect of that stability. Similar to the loss function, there are three standard types of S/N ratios--smaller the better, larger the better, and nominal the best. Therefore, the methods used to calculate the S/N ratio depend on which of the three functional characteristic types, (smaller the better, larger the better, and nominal the best), is desirable. However, the S/N ratio is always interpreted the same way--the larger the S/N ratio, the better it is.

The S/N ratios for the titanium tube weld experiment were calculated using the data collected for each condition (shown in the shaded columns of the array on page 26). The functional characteristic type is larger the better.

Figure 3: Page from student training materials. Demonstrates the technique of omitting transitional sentences. Headers and subject-matter block labels provide linguistic and spatial cues. Horizontal lines added as an additional spatial cue.



GOVERNMENT PROPERTY

CONTROLLED (SEQUENTIALLY NUMBERED TAGS)

USA 53228

TAGGED ITEM: U.S. Government Asset

INVENTORY?: YES

DESCRIPTION: Brass Metal

USAF US 130016

TAGGED ITEM: U.S. Government Asset

INVENTORY?: YES

DESCRIPTION: Aluminum with Adhesive Backing

USAF US 129019

TAGGED ITEM: U.S. Government Asset

INVENTORY?: YES

DESCRIPTION: Yellow Paper Stick-on, Mylar Covering

USA 222

TAGGED ITEM: U.S. Government Asset

INVENTORY?: YES

DESCRIPTION: Brass Metal

Figure 4: Page (reduced) from student resource materials (job aid) in which illustrations were designed to be prominent elements. Shows variation of typical block labeling scheme with two labels referring to all four blocks.

Memorandum

Date:

To: Mark F. Whittier

From:

Subject: Monthly Report for .. 1989

Red Flags The sky is falling, etc. etc., etc....

Yellow Flags The sky may fall if we're not careful because...

Productivity I completed the blueprint milestone for my courseware on...
I taught...
I kept the sky from falling...

Personnel I attended the Falling Sky Seminar on...

Goals

1. Keep the sky from falling.

   Progress to date: wrote the plan, began outline

2. ...

Figure 5: A manager's monthly report format provided to his employees as a model of a monthly report. Conventional memorandum style is augmented by structured writing format using blocked text. Demonstrates high level of internal text structuring, knowledge of eventual recipient (himself), and goal of the communication (concise presentation of problems, progress, and plans).

Caveats About Structured Writing

Structured writing is a flexible tool that allows for stylistic variations, and it may be used in a variety of applications. However, it is not a panacea for developing instructional materials.

Implementing the structured writing approach can be time-consuming from a technical point of view. Creating documents in two columns is not difficult with Macintosh word processing and DTP packages, but word processing packages for IBMs and compatibles do not facilitate the two-column approach.

The cost of creating structured writing documents can be higher than conventionally formatted training materials. In addition to the added development time, a document expands by 20-25%, depending upon the width chosen for the right-hand column.

An eye for design is also required to produce an effective structured writing document. Since page layout (spatial cues) is so important in aiding the learner's assimilation of new information, one must be sure that the layout helps the learner and does not distract him or her from the learning task.

Finally, there are some applications for which structured writing is not appropriate. An essay is one example. It is crucial that the audience and the goal of the communication be clearly in mind before any writing task is undertaken, especially a structured writing document.

Summary

The techniques embodied by structured writing have been derived from an extensive research base on factors that affect the learner's comprehension and retention of text, recommendations of practitioners, and the "Information Mapping" model. In essence, structured writing consists of five essential components:

- clear, well-organized writing
- appropriately chunked information
- effective linguistic or verbal cues
- well-planned typographical cues
- consistent use of informative text layouts and spatial displays

Summary (continued)

Structured writing is a technique that can be used by everyone who has access to a microcomputer and a laser printer. For instructors, course authors, and instructional designers, it is especially useful as a format for the development of print-based instructional materials.

Bibliography

Anderson, R.C. and W.B. Biddle. 1975. On asking people question about what they are reading. In G. Bower, ed., Psychology of learning and motivation, vol. 9. New York: Academic Press.

Armbruster, B.B. and T.H. Anderson. 1982. Frames: Structures for informative text. In Vol. 2 of The technology of text: Principles for structuring, designing, and displaying text, ed. D.H. Jonassen. Englewood Cliffs, New Jersey: Educational Technology Publications.

Ausubel, D.P. 1960. The use of advance organizers in the learning and retention of meaningful verbal material. J of Educational Psychology 51(5):267-272.

Balan, P. 1989. Improving instructional print materials through text design. Performance and Instruction 28(7):13-18.

Braden, R. 1982. The outline graphic. Paper presented at the annual meeting, Association for Educational Communications and Technology, 3-7 May, at Dallas, Texas.

Craik, F.I.M. and E. Tulving. 1975. Depth of processing and the retention of words in episodic memory. J of Experimental Psychology: General 104:268-294.

DiVesta, F.J., C.B. Schultz and T.R. Danzel. 1973. Passage organization and imposed learning strategies in comprehension and recall of connected discourse. Memory and Cognition 4:471-476.

Duchastel, P. 1979. Learning objectives and the organization of prose. J of Educational Psychology 71:100-106.

Duell, O. 1974. Effect of type of objective, level of test questions, and the judged importance of tested materials upon posttest performance. J of Educational Psychology 66:225-232.

Bibliography
(continued)

Frase, L.T. 1969. Paragraph organization of written materials. The influence of conceptual clustering upon level of organization. J of Educational Psychology 60:394-401.

Glynn, S.M., B.K. Britton and M.H. Tillman. 1982. Typographical cues in text: Management of the reader's attention. In Vol. 2 of The technology of text: Principles for structuring, designing, and displaying text, ed. D.H. Jonassen. Englewood Cliffs, New Jersey: Educational Technology Publications.

Goetz, E. and B. Armbruster. 1980. Psychological correlates of text structure. In R.J. Spiro, B.C. Bruce, and W.F. Brewer, eds., Theoretical issues in reading comprehension. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Gropper, G.L. 1988. How text displays add value to text content. Educational Technology 28(4):15-21.

Hamaker, C. and P.A. Kirschner. 1981. The effect of adjunct application questions on the recall and application of text information. Paper presented at annual meeting of the American Educational Research Association, April, at Los Angeles, California.

Hartley, J. 1984. Current research on text design. Bulletin of the British Psychological Society 37:116-119.

Hartley, J. 1982. Designing instructional text. In Vol. 1 of The technology of text: Principles for structuring, designing, and displaying text, ed. D.H. Jonassen. Englewood Cliffs, New Jersey: Educational Technology Publications.

Hartley, J. and I.K. Davies. 1976. Preinstructional strategies: The role of pre-tests, behavioral objectives, overviews, and advance organizers. Rev of Educational Research 46(2):239-265.

Horn, R.E. 1982. Structured writing and text design. In Vol. 1 of The technology of text: Principles for structuring, designing, and displaying text, ed. D.H. Jonassen. Englewood Cliffs, New Jersey: Educational Technology Publications.

Hydén, H. 1977. The differentiation of brain cell protein, learning, and memory. BioSystems 8:213-218.

Jonassen, D.H., ed. 1982. 2 Vols. The technology of text: Principles for structuring, designing, and displaying text. Englewood Cliffs, New Jersey: Educational Technology Publications.

Jonassen, D.H. and P.A. Kirschner. 1982. Introduction to section 2: Explicit techniques for structuring text. In Vol 1. of The technology of text: Principles for structuring, designing, and displaying text, ed. D.H. Jonassen. Englewood Cliffs, New Jersey: Educational Technology Publications.

Kallison, J.M. 1986. Effects of lesson organization on achievement. American Educational Research Journal 23(2):337-347.

Kintsch, W. and T.A. van Dijk. 1978. Toward a model of text comprehension and production. Psychological Review 85:863-894.

Mandler, J.M. and N.S. Johnson. 1977. Remembrance of things parsed: Story structure and recall. Cognitive Psychology 9:111-151.

Melton, A.W. 1967. Repetition and retrieval from memory. Science 158:532.

Merrill, M.D. and L.M. Stolurow. 1966. Hierarchical preview vs. problem oriented review in learning an imaginary science. American Educational Research Journal 3:251-261.

Merrill, M.D., B. Wilson and J.G. Kelety. 1979. Elaboration theory and cognitive psychology. Working paper #127. San Diego, California: Courseware, Inc.

Bibliography
(continued)

Meyer, B.J.F. 1982. Signaling the structure of text. In Vol. 2 of The technology of text: Principles for structuring, designing, and displaying text, ed. D.H. Jonassen. Englewood Cliffs, New Jersey: Educational Technology Publications.

Meyer, B.J.F. 1979. A selected review and discussion of research on prose comprehension. Prose Learning Series: Research Report #4. Tempe, Arizona: Arizona State University, Department of Educational Psychology.

Pace, A.J. 1982. Analyzing and describing the structure of text. In Vol. 1 The technology of text: Principles for structuring, designing, and displaying text, ed. D.H. Jonassen. Englewood Cliffs, New Jersey: Educational Technology Publications.

Rickards, J.P. 1977. On inserting questions before or after segments of text. Contemporary Educational Psychology 2:200-206.

Romiszowski, A.J. 1986. Developing auto-instructional materials: From programmed texts to CAL and interactive video. New York: Nichols Publishing.

Romiszowski, A.J. 1977. A study of individualized systems for mathematics instruction at the post secondary levels. Ph.D. diss., Loughborough University of Technology, U.K.

Rothkopf, E.Z. 1965. Some theoretical and experimental approaches to problems in written instruction. In D. Krumholtz, ed., Learning and the educational process. Chicago: Rand McNally.

Shavelson, R. 1972. Some aspects of the correspondence between content structure and cognitive structure in physics instruction. J of Educational Psychology 63:225-234.

Shimmerlik, S.M. 1978. Organization theory and memory for prose: A review of the literature. Rev of Educational Research 48:103-120.

Showstack, R. 1982. Printing: The next stage: Discourse Punctuation. In Vol. 1 of The technology of text: Principles for structuring, designing, and displaying text, ed. D.H. Jonassen. Englewood Cliffs, New Jersey: Educational Technology Publications.

Soyster, T.G. 1980. A comparison of the effects of programmed instruction and the information mapping method of instructional design on learning and retention of students with different mental abilities. Ed.D. diss., Temple University.

Stein, N.L. and T. Nezworski. 1978. The effects of organization and instructional set on story memory. Discourse Processes 1:177-193.

Stelnicki, M. 1980. The effects of information-mapped and standard text presentations with fact and concept levels of learning on low general ability adult learner cognition. Ed.D. diss., Northern Illinois University.

Stuart, T.H. 1979. The effectiveness of information mapping compared with the conventional paragraph in communicating technical information. Masters thesis, University of the Philippines at Los Banos.

Thompson, E. 1960. An experimental investigation of the relative effectiveness of organizational structure in oral communication. Southern Speech Journal 26(1):59-69.

Thorndyke, P.W. 1977. Cognitive structures in comprehension and memory of narrative discourse. Cognitive Psychology 9:77-110.

Tulving, E. and D.M. Thomson. 1971. Retrieval processes in recognition memory: Effects of associative contexts. J of Experimental Psychology 87(1):116-124.

Bibliography
(continued)

Waller, R. 1982. Text as diagram: Using typography to improve access and understanding. In Vol. 1 of The technology of text: Principles for structuring, designing, and displaying text, ed. D.H. Jonassen. Englewood Cliffs, New Jersey: Educational Technology Publications.

Webber, N. 1979. Some results of using the information mapping writing service standards at Pacific Telephone Company. Paper presented at National Society for Performance and Instruction, 12 April, at Washington, DC.

Whiteside, J.A. and M.F. Whiteside. 1988. Case for "Organizing Word-Visuals" to facilitate recall from text-based materials. Reading Psychology 9(4):323-341.

IMPLICATIONS OF CREATIVITY RESEARCH FOR MANAGERS OF INSTRUCTIONAL DESIGN

Richard Couch
Helen B. Miller

The designer of instruction aims to activate and support the learning of the individual. By utilizing both the attributes of a systems approach to instructional design and research on creativity, the designer enhances his chance of developing an instructional package that is novel, instructionally useful, and of high quality. The premise of this paper is that in order to design and develop successful, innovative instruction to meet the needs of ever changing academic and business learning environments, managers and designers need to understand what creativity is and how it should be applied to the work place. It is important to promote the development of more creative instructional designers. This premise is based on a belief that creative designers nurtured in a creative environment will produce creative instructional products. It is also based on the belief that creative instructional products tend to entice the learner's active participation in learning. To support the above premise, this paper will define creativity, explain the inherent connection between creativity and the systems approach to instructional design, and make recommendations for the cultivation of creative designers and therefore more creative instruction.

Creativity

Creativity is most often defined by one of the three criteria; personality, process, and product. Stein (as cited by Amabile, 1983) suggested that creativity results in the production of some novel product that is useful, tenable, or satisfying, and represents a real "leap" away from what has previously existed. Newell, Shaw, & Simon (1962) suggested that creative activity is a type of special class of problem-solving activity characterized by novelty, unconventionality, persistence, and the difficulty in problem formulation.

Creativity is often measured by originality. The idea of novelty or originality seems to be the main criterion upon which researchers in the field of creativity can agree. The focus of creativity research has been, first, on accepting society's labeling of creative products and then second, working with the creative individual who produced the product. Researchers attempt to assess personality traits and processes that the individual used in the creative process. There is little evidence to support the assumption that creativity and intelligence are related; creative achievement and IQ do not correlate well (Amabile, 1983; Barron, 1968).

From the research on creativity the following are some assumptions about creativity (Amabile, 1983):

- Talent, education, and cognitive skills do not by themselves appear to be sufficient for high levels of creativity.
- Particular clusters of personality traits are found fairly consistently among individuals exhibiting high levels of creativity.
- For high levels of creativity, there seems to be a match between individuals and domains (e.g. an individual and music composition).

In many fields it is common to find technically proficient people who are not necessarily creative. Creativity is a matter of degree. To some degree, everyone possesses the ability to be creative. If we accept only the masters like Einstein, Frank Lloyd Wright, Mozart or Picasso as our symbols of creativity, then everyone else falls far short of being creative by those standards.

Creative thinking is often discussed in terms of the results obtained from the process.

> Creative thinking is thinking patterned in a way that tends to lead to creative results. This definition reminds us that the ultimate criterion of creativity is output. We call a person creative when that person consistently gets creative results, meaning, roughly speaking, original and otherwise appropriate results by the criteria of the domain in question" (Perkins, 1984, p. 18-19).

When the domain is "design" we talk of form and function. In the domain of instructional design results are a learning package or presentation. Creativity for designers is a product which demonstrates originality, novelty, or uniqueness. The "form" of instructional design is the structure of the systematic approach. The "function" of design is measured by its effectiveness as a learning tool as well as its innovative delivery.

Inherent Creativity Within The Systematic Approach To Instructional Design Model

Design of any kind lacks explicit rules and therefore, requires unique problem solving strategies in every case. This lack of rules demands creativity on the part of the designer (Eastman, 1968).

Gagne and Briggs (1979) defined instructional design as a systematic thinking and planning approach to designing instruction which makes use of all theory and research evidence available, and that can be supplemented by the iterative, self-correcting process of empirical tryout and revision. This global, iterative view of the instructional design model allows for much flexibility and creativity within the design process. However, a systematic model could lead to an algorithmic (rather than heuristic) design approach which might produce instructional products which are technically proficient but boring and unadaptable to changing needs.

Design, like any other problem solving activity, is transformation. Beginning with information, the designer's task is to transform the information into an acceptable solution state (Reitman, 1964). The design problem usually is started with some information about the beginning transformation state. "In architecture, information is often given about the site, money available, functions and tastes of the people the building will house, as an example. Some information is also given about an acceptable solution state: partial information about rooms, the finished site, and possibly materials, along with the assumption that the final state must respond in some undefined way to the existing functions and states of the people involved. From these goals expressed in a partial specification of the final state, e.g., the working documents describing the construction of a building" (Eastman, 1968, p. 5). This transformational state in architectural design is analogous to the instructional design process and its finished instructional package. Just as there are boring, dysfunctional buildings, there are boring, dysfunctional instructional packages.

Within the steps of the systematic design model are decision junctures. Each decision is a small problem solving exercise or design unit. Each of these junctures is controlled by constraints which can be categorized as "goal constraints" and "internal constraints." Some of the constraints are in place because of the initial problem (the initial transformation state). Examples of "goal constraints" are the budget, the length of time to develop the package, and the outcomes to be derived. Management often has control of goal constraints. By focusing on improving these goal constraints, managers can enhance creative solutions to internal constraints.

Internal constraints are component constraints which encumber the instructional design because of decisions made along the way while developing the instructional package. That is, when an instructional designer makes one decision, to use computer assisted instruction, for example, that decision produces other constraints. The flexibility and iterative nature of the systems approach allows for considerable creativity in problem solving choices within these internal constraints. The iterative process of the systems approach to instructional design, inherently allows the designer to constantly "relook" at the resolution of the problem (Eastman, 1968).

The decisions within the "system" will determine how many iterations are necessary to solve the problem. The creativity of the designer will, hopefully, determine the most creative solution for each of these component problems.

Challenges for a Creative Design Approach

Unfortunately, in many settings, whether business or education, employees are often in situations that demand repetition rather than creativity, conformity rather than diversity (Byrd, 1986). This is no less true in the design environment. Management may actually support these situations by insisting on design being implemented and evaluated in a prescribed, but stilted manner. In some cases, the "amount of originality" wanted may not be clearly explained by supervisors.

The following factors restrict the development of creative instructional design packages: cost, time, trust, and fear. Another factor which restricts creativity is the lack of strategical planning on the part of management to hire, to support, and to develop creative designers. These factors can be defined as "goal constraints" which control design decisions.

Cost is of concern to the instructional designer in both industry and education. In the design process there are material costs and personnel costs. Material costs include the cost of the hardware, for example, computers, interactive videodisc players, video equipment, and so forth. The computer software, workbooks, study guides, computer programs, and so forth are also material costs. Hardware costs are generally a one time investment to be used repeatedly for a variety of instructional uses. (Obviously, upgrading hardware is costly, but it does not play a role in lack of creativity as we define it here.) Software, likewise remains a relatively stable cost item, that is, an uncreative software package is likely to cost about the same as a creative package.

An explanation which is often given by administrators and supervisors to justify instructional products which are not very exciting or innovative is that creativity takes too much time. Yet, if the instructional product lacks novelty, usefulness or quality, it may be met with dissatisfaction among learners. Strict constraints on time give the message to the designers that production is more important than innovation. When designers in architecture are routinized there seem to be a high number of design errors. The same argument holds for instructional designers. Algorithmic structure is a drain on creativity as well as on other resources. When an organization uses highly sophisticated instructional delivery systems such as teleconferencing or computer hardware and software, these design errors are costly. When employees are dissatisfied with the product which they produce or the amount of input they are allowed to contribute, they become disgruntled and unhappy. Allowing and encouraging creativity is a way of "empowering" employees. If a company allows a moderate amount of creativity and risk taking, then their design products do not reflect an organization ready to stagnate and die. The converse is true. Creative instructional products reflect an organization which is progressive and dynamic in structure and vision.

Trust is another factor in the development of creative instruction. To allow for creativity some designers work "inside their heads" while others externalize. The manager must realize that constant high pressure accountability may not be in the overall best interest of a person bent on developing a creative product. It is hard to create with someone looking over your shoulder all the time. We do not advocate lack of accountability on the part of the designer nor his supervisor. However, often in the creative process, a creative designer cannot tell you where he is in relation to a finished product. This type of designer may have a "leap of insight" into the resolution of the problem. The manager/supervisor must know this type of designer well enough to trust that he/she will produce a creative, worthwhile finished package. Again, this is a way of empowering the designer. At the same time, the iterative nature of the systems approach to instructional design allows for "creative checks" at the natural decision junctures or "design units" within the overall product.

Fear is the most prominent roadblock to creativity in any organization. This is compounded in an area such as design where creativity is necessary and expected. As Koberg and Bagnall (1981) point out,

> Fear is simply the reluctance and anxiety to deal with the unexpected or the result of lack of preparation to deal with the expected. But fear deters progress toward creativity through misdirecting our energy. By changing our focus from "I don't want to be wrong" to "I will try to be right" the positive point of view can help you to overcome this block to creativity.

It is necessary to eliminate the following roadblocks to creativity within the instructional design process:

- fear of making mistakes
- fear of being seen as a fool
- fear of being criticized
- fear of being misused
- fear of being alone (a person with an idea is a minority of one)
- fear of disturbing traditions and making changes
- fear of being associated with taboos
- fear of losing security of habit
- fear of losing the love of the group
- fear of truly being an individual
- fear of being "successful"(Koberg & Bagnall, 1981).

The impetus for overcoming each of these fears does not come from the management or supervisor only. The notions of "team," "communication," and "comfort" are significant in the success of a creative systems approach.

Every member of the team must feel comfortable within the group, must feel that he is an important member of the team and that his views are valuable. He/she must be allowed to communicate his ideas no matter how fanciful they may seem at the time. In order to accomplish the building of a team or community the members of the team must work toward developing a community.

Strategical Planning is a way of increasing the instructional designer's ability to be creative. A manager may underestimate her ability to influence the level of creativity in her designers. A manager's lack of understanding of creative design may contribute to the tactical mistake of placing constraints on the instructional design process. Often managers have trouble giving up control of either the process or the product. Due to the reporting of the extensive research on creative personality, there is a tendency to make the generalization that to produce creative products one only has to hire a creative designer. This factor reflects a misconception of creativity. Creativity is a trait that can be nurtured and promoted. There are levels of creative ability, but whether a designer feels able to access these creative skills may be determined by the atmosphere of the workplace rather than the structure of his own personality.

Recommendations for Making More Creative Instructional Products

To develop more creative instructional products, management must aid the designer through an understanding of "creativity" and by enhancing the environment in which the designer works. The research on characteristics of creativity has encouraged such researchers as Amabile (1983), Csikszentmihalyi (1975) and Simonton (1975) to promote the development of a social psychology of creativity. Their studies of the social psychology of creativity provides information on the relationship between social environments and creative productivity and in this way provides a means of influencing and promoting creative behavior. Amabile (1983) argued that while changing cognitive skills is possible, it may take extended training and time. Social environments, however, could be changed more easily and, therefore, could have immediate observable effects on creative behavior. The following section suggests methods to enhance creativity within the work environment. The ideas cited are derived mainly from Amabile (1983) and Csikszentmihalyi (1975).

- Intrinsic Motivation:

1. Give the designer control in product development. This enhances the designer's involvement and interest in the project.
2. Free the designer from extensive external evaluation. Intrinsic motivation and creativity is enhanced with low levels of surveillance.
3. Allow the designer to make choices in the design; try to reduce external constraints on the project. Creativity is enhanced when control comes from within the project team.

- Modeling:
  Mentoring with creative individuals early in a career may promote creative design habits.

- Creativity Heuristics:
  Encourage work strategies that have proven effective in producing creative products.

1. Encourage the taking of risks.
2. Encourage playful exploration of possible solutions.
3. Encourage the use of concentrated, massed work sessions.
4. Generate ideas so that these can set off further ideas.
5. Rearrange the elements of the problem; take a break; rough out a plan for a solution in terms of just the important elements before attempting a solution in detail.
6. Play with ideas.
7. Try something counterintuitive.
8. Make the familiar strange and the strange familiar.
9. Generate hypotheses by analyzing case studies, use analogies, and account for exceptions.

- Use of Rewards:
  Researchers have demonstrated that reward is often detrimental creativity. Therefore, reward should be used as indication of good performance, not as a control over design.

- Organizational Climates:
  1. Organizational structure flexible enough to bend with the stress of innovation.
  2. Climate conducive to new ideas.
  3. Use a systematic process for developing new ideas into products.
  4. Support for innovation from administration
  5. Work setting should have low levels of surveillance and low levels of evaluation.

- Designers should learn to reason in a systematic way; test ideas systematically rather than reject "out of hand." Allow people to set final or intermediate products aside and come back to them later; give them time to evaluate intermediate products with more distance. Ask that the designer subject his ideas to practical and theoretical tests, both internal (within the organization) and external (outside the organization). Allow designers to explore the amount of risk involved in the development of a product and allow the designer to make decisions based on the economic and personal risk factors.

- Develop adventurous spirited designers. Allow designers to work at the edge of their competence--let them push their limits. Teach designers to be open to any environmental stimulus. Brainstorming is a good example of environmental stimulus.

- Teach designers to observe more closely, to listen and actually hear what is being said, to paraphrase in order to clarify, and to use other observational techniques.

- Teach designers about the creative process. Dispel the prevalent notion that creativity involves a "master work." Creativity is present in varying degrees in everyone. We must offer designers instruction in ways to be more creative. We must offer managers methods to change the work environment so that creativity is encouraged.

Conclusion

In this paper the authors have supported the premise that creative instructional products are needed. Emphasis has been placed on the need to change the atmosphere of the workplace to encourage the development of creative products rather than cognitive training for the designer. Everyone has some level of creativity; encouraging designers to employ their creative juices may be enhanced by creative management of organizational climates. Managers can structure an atmosphere for creative design more easily and less expensively than they can change the personality or cognitive traits of a designer. The cost benefits in materials and personnel will become evident, as well. Setting stringent "goal constraints" and emphasizing "tight accountability" of "internal constraints" actually may be destroying creativity rather than promoting it. There is a need to move research results beyond the journal article into practice. Management and designers alike need to be knowledgeable about creativity, what fuels creative design and how to implement strategies to insure its development. Management has experienced the value in the systems approach to instructional design productivity. Now is the time to promote an understanding of creativity and the development of creative instructional designers.

References

Amabile, T. M. (1983). The Social Psychology of Creativity. New York: Springer-Verlag.

Barron, F. (1968). Creativity and Personal Freedom. New York: Van Nostrand.

Byrd, R. E. (1986). C&RT: The Crealtrix Inventory. San Diego, CA: University Associates, Inc.

Csikszentmihalyi, M. (1975). Beyond Boredom and Anxiety. San Francisco: Jossey-Bass.

Eastman, C. M. (1968). Explorations of the Cognitive Processes in Design. Pittsburgh, PA: Carnegie-Mellon University.

Gagne, R. M. & Briggs, L. J. (1979). Principles of Instructional Design. New York: Holt, Rinehart and Winston.

Koberg, D. & Bagnall, J. (1981). The Universal Traveler. Los Altos, CA: William Kaufman, Inc.

Newell, A., Shaw, J., & Simon, H. (1962). The processes of creative thinking. In H. Gruber, G. Terrell & M. Wertheimer (Eds.), Contemporary Approaches to Creative Thinking. New York: Atherton Press.

Perkins, D. N. (1984). Creativity by design. Educational Leadership,9, 18-25.

Reitman, W. (1964). Heuristic decisions procedures, open constraints, andthe structure of ill-defined problems. In G.L. Bryan & M.W. Shelly (Eds.) Human Judgments and Optimality. New York: John Wiley.

Simonton, D. K. (1975). Sociocultural context of individual creativity: A transhistorical survey. Journal of Cross-Cultural Psychology,32,1119-1133.

A VISUAL APPROACH TO GROUP AUTHORSHIP

Janet E. Boyle
Merton E. Thompson
R. J. Van Dreser

Traditionally, group authorship has involved two or more people writing separately, followed by an attempt to meld each person's narrative into one cohesive document. Authors collectively struggle to revise and make corrections or use a cumbersome "cut and paste" routine with individual copies. Although members may work in a group setting, their efforts are individual in nature. Valuable writing time and efficiency are lost as time is spent attending to questions such as "Where are we?" or What page is that on?" The consequence is a loss of focus on ideas. As a result, group authorship is often viewed as a frustrating rather than a productive venture.

Other problems related to group authoring include:

1. A series of retypings is necessary as revisions are made.
2. Individuals become possessive of ideas and resist suggestions for revision from coauthors.
3. Needed improvements are left undone because of the effort involved in obtaining consensus and producing a new version.
4. Coauthors' writing and editing styles may not be compatible.
5. Transitions among components written by different authors may be cumbersome or nonexistent.

These problems often result in the lack of a comprehensive approach.

A different strategy was conceived by the authors of this article as they struggled to prepare a series of grant proposals. Initially the authors collectively wrote and edited in longhand. Between writing sessions one of the group members word processed the longhand text generated. At subsequent meetings the next round of revisions were made by the group writing between lines on double spaced copy and "cutting and pasting" the information.

To expedite the process, the group decided to write and edit simultaneously using a word processor during the group meetings. The three worked together using a single monitor, each added input and reacted to one another as the document developed. After becoming familiar with the process of simultaneously writing and editing collectively, the efficiency of the technique enabled the authors to write five grant proposals in a total of approximately 30 hours of meeting time.

Later, a committee of ten faculty, including these three authors, was directed to prepare two major grant proposals within a four-week timeframe. To encourage input from all participants and to expediate the process, the three authors introduced the concept of group authorship using a word processor. To accommodate viewing by the larger group, a liquid crystal display was used to project an enlarged image onto a 10 x 10 foot classroom screen.

The initial committee meeting was a brainstorming session to provide ideas for the grant proposals to the content specialist. The content specialist then produced a first draft that incorporated group ideas into the proposal format. At the second meeting, committee members were given printed copies of this draft; simultaneously the text was projected onto the screen. Committee members not familiar with word processing or data projection seemed impressed with the projected image but saw no immediate application of it. They continued to make revisions on their printed copy as the writing session progressed.

Within a few minutes, however, group members began to perceive the efficiency inherent in simultaneously composing and editing using word processing. They soon found they could not keep pace by making written revisions on their individual copies. They also recognized the redundancy of their efforts, and soon all participants turned their attention to the projected text. After approximately 15 minutes, all committee members had abandoned their printed copies and were working directly with the projected text.

The advantages realized using this procedure compared to a more more traditional approach are:

1. Expediency

   Three major grant proposals were written collectively by multiple authors in a two month period and with a total elapsed time of 20 hours.

2. Immediacy

   As the document was being developed it was continually available for review and revision. No time lag was incurred for retyping to incorporate changes. The content of ideas was developed until it was written in a comprehensible form and not allowed to get lost between writing sessions.

3. Synthesis

   The process encouraged intermingling of individual writing styles so the final document reflected the composite strengths of all the authors involved.

4. Accommodation

   Individual authors felt comfortable contributing their expertise in editing, phrasing, mechanics, content and evaluation. As the content was developed all aspects of the document emerged simultaneously. Individual strengths in the writing process emerged as some focused upon the content while others paid attention primarily to writing style and other grammar.

5. Cooperation

   Members were willing to share ideas on a give and take basis without negative ego impact. Since the document evolved as a product of all, individuals were not threatened by suggestions directed at "their" input.

6. Flexibility

   People dropped in and out of writing sessions according to individual schedules. Individuals were able to enter the process, assess the situation and immediately make contributions.

7. Integration

   Junior and senior faculty had an opportunity to demonstrate their expertise to each other and work harmoniously. The result was a blend of idealism and historical perspective reflecting the variety of backgrounds and experiences of the members.

8. Shared ownership

   Spontaneous comments from faculty after each session demonstrated the sense of collective accomplishment felt by all involved.

9. Collegiality

   Continuing outcomes have been a sense of appreciation for coworkers, an increased willingness to share endeavors, and a growing mutual respect among those involved.

10. Companionship

    An unanticipated outcome was the discovery that the collective endeavor was enjoyable and even included aspects of productive social interchange.

Group authorship when facilitated by appropriate technology can enhance the writing process and elicit strengths of those individuals involved. Although this article may appear to emphasize technology, in reality ready access to technology allows people freedom to concentrate on issues and develop creative solutions. Removing inhibitions and obstacles normally inherent in group authorship fosters an atmosphere in which the satisfaction derived from quality writing can be realized in an efficient and effective manner.

A SYSTEMS APPROACH TO THE PRODUCTION OF A SLIDE PRESENTATION

John P. Vergis

William James, the great American philosopher, reminded us a century ago that "the world is a buzzing, blooming confusion". Despite the progress we have made in a hundred years, to some people the world still is a blooming confusion. Order is not easy to come by. Most of us have to work hard to achieve it but some have to work harder than others.

Right brain left brain studies tell us that each hemisphere of the brain controls different ways of sensing and reacting to our environment. The left half is proficient in the use of words, figuring things out step by step, in seeing objects and events in a time sequence, and in arriving at conclusions based on facts. On the other hand the right half makes us aware of things in space, helps us form gestalt wholes, is the home of artistic expression and is the wellspring of our imagination.

In some of us the left brain is dominant, in others the right. This difference may account for our varying abilities to find order in our lives. Since the dominant lefts are inherently better equipped to tap their verbal abilities, they are better able to perform organizational tasks. We dominant rights have to try harder to accomplish the same ends. Happily,, there is help out there, a panacea that can unsnarl our tangled thoughts. It's a panacea within the grasp of all of us. It's called systems analysis or, as I prefer, the systems approach.

Using a system to achieve a goal is not new. The approach has been around at least since the Egyptian engineers built the pyramids and the Babylonians constructed the hanging gardens. It is being used today by modern engineers, architects, corporation executives, computer analysts, city planners, and a host of others. It was popular in educational circles twenty years ago, but, like so many other administrative procedures, it wasn't used as widely as it could have been and hence had little chance to fulfill its potential.

Now that computers are a part of everyday life, the systems approach makes more sense than ever. Any information that requires careful sequencing can be programmed, stored and retrieved easily. For example, consider the steps in a systemized production of a film, video or slide program: you select a topic, goal and objectives, analyze the prospective audience, collect and study pertinent data, devise production procedures and finally test and evaluate the results to form conclusions and feedback. If this procedure seems familiar, it should. It is the practical application of the scientific method.

EXPLANATION OF THE CHART

I. Need for the product: If more visual presentations better fitted the need for which they were designed, there would be far fewer communication breakdowns. too often the choice and medium are chosen before the validity and requirements of a need are determined, and, as a result, there often is little correlation between content, medium and need. Another point to consider is whether the need is for a product that will stand by itself or for one that will be part of a larger system from which it will assume inputs and for which it will produce outputs.

II. Goal: The goal is a generalized statement of what it is hoped the product will accomplish. It may also help decide whether the purpose is to entertain, instruct or simply for the content to be known.

III. Target audience: The more you know about your prospective audience the more chance you will have to communicate your message effectively., Meaning is in people, not messages. Successful productions are those that audiences find most meaningful. It follows, therefore, that knowing an audience helps you produce a more effective presentation.

Obviously the product should fit the audience's age level. Talking up or down never works. Viewers also must be able to see and hear the message. This may seem unnecessary advice, but I've been in situations where people, especially the elderly, had problems with their sight and hearing. Intelligence, educational level, prior knowledge of the content, attitudes and perception ability are other important factors to consider. It's well known, for example, that in the last election most liberals and conservatives seldom viewed each other's TV campaign commercials objectively. Their attitudes blinded them. The foregoing suggests that you as a producer either prepare materials to fit homogeneous audiences or develop products that are general enough in scope to be meaningful in spite of viewers individual differences.

IV. Content/task identification and analysis: This is the time and place to begin gathering information and analyzing its relative worth in view of achieving your goal. Now that you have an idea what the subject is, you can place the data and procedures in a logical outline and decide on the objectives. According to some system designers, the difference between content and task is that the former includes all the necessary information while the latter pertains only to how material elements of processes are identified and organized in serial form.

V. Objectives: In order to measure and evaluate modifications in viewer behavior you must anticipate what kind of observable behavior is desirable. Objectives serve two purposes: 1) They tell viewers what behaviors are expected of them upon completion of the presentation and 2) they serve as yardsticks by which to measure how well viewers demonstrate anticipated behaviors. There are three classes of objectives. They are the cognitive (factual knowledge, problem solving, symbol identification, etc.); the affective (emotions, aesthetics, etc.); the psychomotor (hand and foot skills, sports, etc.).

VI. Media selection: If there is a single, crucial, all important moment in building a visual presentation, this is it. Nothing can take the place of a well chosen medium that effectively illustrates the outcomes required by the objectives. If motion is integral to understanding a process, then film or video would be better than still pictures. If the medium is to be used in non-electrified places impossible to darken, then flip charts, flat pictures, drawings and felt boards could suffice. In short, the medium must not only contain correct content, it also must be designed with the target environment and audience in mind.

VII. Production analysis and development:Production of the presentation begins with the treatment, which is a brief synopsis that summarizes the story line, lists and describes the characters and the setting, the implied action, and perhaps the way the production is to be made and utilized. Writing the treatment not only gives you an opportunity to organize your thoughts, but it also serves as an indispensable link between you and a client when there is one.

Except for the independent producer who serves as his own client, there normally is an external client who calls the shots and foots the bill. He furnishes the need and goal, selects the type of audience, suggests and/or provides the subject matter, and has a general idea what he wants the production to accomplish. Hopefully he leaves the details to you, but that's not always the case. Some clients want to be party to all decisions, no matter how minor. Others pay little attention, leaving most decisions to you and then, too late, find fault with your choices. Sometimes the client keeps changing his representatives; you begin with Mr. Jones and go through Smith, Brown and others before you're done. Then there are the committees that may have difficulty agreeing about anything. You have to take them all in your stride and hope for the best

A shooting script includes the content of each shot modified by the type of lighting, camera angle, lens and other pertinent data. Opposite each shot is placed the dialogue, narration and/or an indication of kind of music and special effects. Talent (actors and crew) can be chosen at this time.

Storyboarding, photographing and editing are where imagined visuals take form on paper and film. The knowledge and skill that these two activities require are too complex to describe in this brief overview. Storyboarding calls for a vivid sense of imagery and at least minimal sketching ability. Filming should be handled by a skilled photographer followed by a competent film processor. Editing slides is simple compared to putting film and video tape in order. All one has to do is either reject unwanted pictures or reshoot and/or add new ones. sound recording and editing is another story. Oddly enough, though we tend to rely more on our eyes than our ears, poor sound is more disturbing than an occasional poor picture. Sound recording and editing should be done by an experienced sound technician.

VIII. Evaluation: After the presentation is over how does the producer and/or client know whether or not the program was worth the time, money and effort? Unless some form of testing is used to provide data for evaluation there is no conclusive way to assess the worth of the presentation.

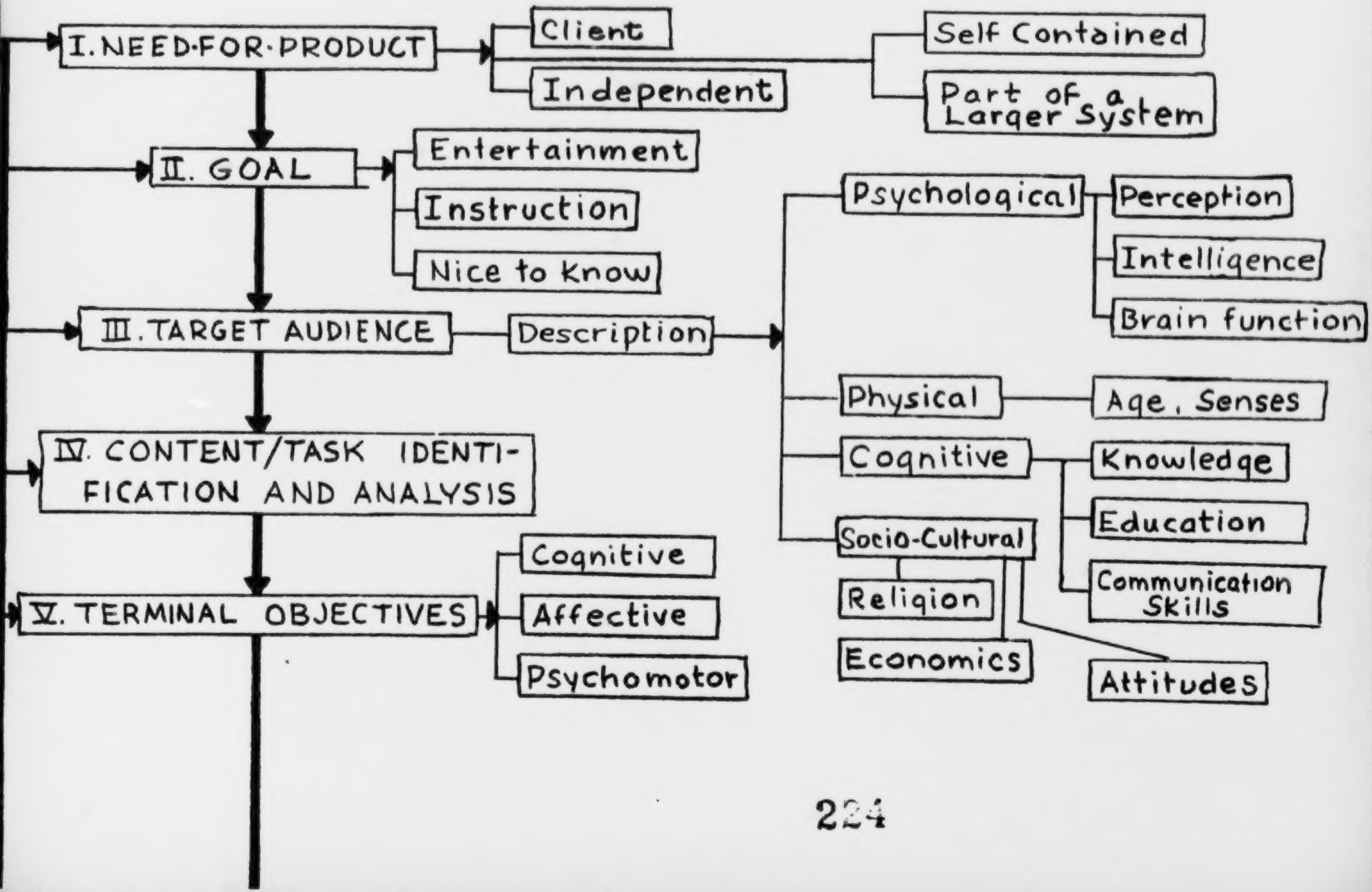
IX. Feedback: Evaluation results are typically looped back into the system and serve as guides to assessing strengths and weaknesses of each of the elements and their sub-systems. This information can be used to renovate the presentation or be used later to build new and better ones.,

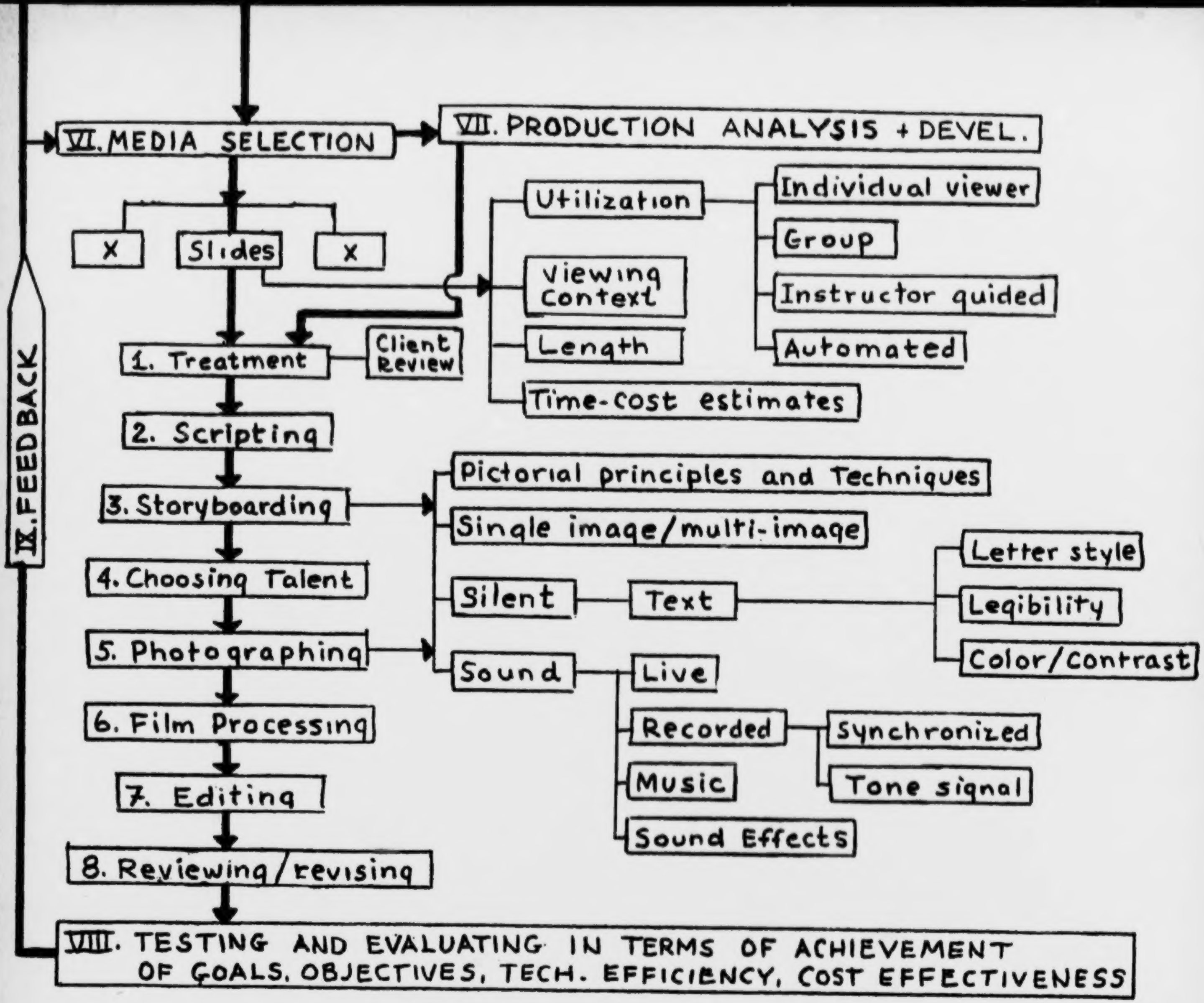
A FINAL WORD

I know that the foregoing may seem elementary to many of you who have been producing successful presentations through the years. However, I hope that by charting critical items and their interrelationship, the resulting overall pattern may be helpful. Here is an example of what I mean. I know a professional photographer who produces excellent slide shows. Among his clients are some of the biggest corporate names in the country. My friend researches his subject content, uses the best graphic artists, meticulously photographs the scenes and oversees the final screening. Everything is well done except there is no clear-cut statement of objectives, hence he and his client have no guide post by which to measure whether or not the viewers profited from the presentation. This lack is more the client's fault than my friend's. Apparently some clients feel that if a production covers the subject, is professionally done, and looks impressive, it must be doing its job. As a result my friend, and perhaps others like him, continue to produce slide shows that are technically superb but that lack the critical element necessary to evaluate their real worth.

The chart below illustrates one way to logically sequence data and procedures. It is not the only way. Regard it as a convenient check list. For your purposes you may wish to change continuity or delete some items and include others. Changes can work as long as they take into account basic systems principles.

A SYSTEMS APPROACH TO THE PRODUCTION OF A SLIDE PRESENTATION


I. NEED·FOR·PRODUCT
Client
Independent
Self Contained
Part of a Larger System
II. GOAL
Entertainment
Instruction
Nice to know
III. TARGET AUDIENCE
Description
Psychological
Perception
Intelligence
Brain function
Physical
Age, Senses
Cognitive
Knowledge
Education
Communication Skills
Socio-Cultural
Religion
Economics
Attitudes
IV. CONTENT/TASK IDENTIFICATION AND ANALYSIS
V. TERMINAL OBJECTIVES
Cognitive
Affective
Psychomotor


VI. MEDIA SELECTION
VII. PRODUCTION ANALYSIS + DEVEL.
X
Slides
X
Utilization
Individual viewer
Group
Instructor guided
Automated
Viewing Context
Length
Time-cost estimates
1. Treatment
Client Review
2. Scripting
3. Storyboarding
4. Choosing Talent
5. Photographing
6. Film Processing
7. Editing
8. Reviewing/revising
Pictorial principles and Techniques
Single image/multi-image
Silent
Text
Letter style
Legibility
Color/Contrast
Sound
Live
Recorded
Synchronized
Tone signal
Music
Sound Effects
IX. FEEDBACK
VIII. TESTING AND EVALUATING IN TERMS OF ACHIEVEMENT OF GOALS, OBJECTIVES, TECH. EFFICIENCY, COST EFFECTIVENESS

JOHN P. VERGIS '89

VISUAL IMAGING ON THE COLOR COPIER/THE NEW GENERATION

Mary Stieglitz Witte

The copier emerged as an art imaging tool when the first commercial plain paper copier was introduced in 1959. Artists experimented with photocopiers almost immediately, and responded with increased interest when the first full color copiers became available. In 1968, the 3-M Company introduced the 'Color in Color' copying system. By the early 1970's, artists were working on the 3-M machines (system I & II), and on the color Xerox 6500.

These early color copiers offered a potential tool for the translation of creative art concepts. Based on a three color system, they allowed for the manipulation and interchange of color. The transfer of the color images to a wide variety of other materials and surfaces was also possible. The 3-M systems employed a matrix which could be heat transferred to fabric and other support materials. A coated transfer paper was developed which could be used in the Xerox 6500' and also heat transferred.

The 6500 and the 'Color in Color' System 11 also created color prints from color slides. These dry color copiers, with their range of capabilities, became tools of both fine arts and graphic arts. Art exhibitions began to show 'electrostatic' or 'xerographic' art, and some manufacturing firms used color copiers in their design departments. The concept of the color copier as an art studio & design tool was born. The full color copier presented the artist with a new opportunity for direct, reciprocal participation in the image making process.

As with any emerging technology, limitations became apparent as quickly as advantages. The main problems experienced were fugitive color, mediocre resolution, and often harsh colors without a rich black. In fadeometer tests run by this author in the early 1970's, the reds were observed to fade quite rapidly. image clarity was often difficult with the projection systems, even from crisp, well focused original slides. Regardless, a considerable number of artists and designers discovered these new tools and made creative use of their capabilities.

By 1970, a course called "Generative Systems" was initiated at the Art Institute of Chicago. lt made use of the 3M 'Color in Color' system. 'Copier art', 'electrostatic art' and 'xerography' began to appear in art exhibitions. ln 1979, the lnternational Museum of Photography presented "Electroworks" in Rochester, New York. Today centers or societies for copier art exist in numerous locations, including New York, Montreal, Toronto, and Mulheim an der Ruhr (Germany).

The many directions evident in the work of copier artists, combined with the increased capabilities of the new generation of color copiers now emerging, provide a rich ground for new directions in imaging. The changing technology makes the term 'imaging' more appropriate than ever, as no longer can we neatly separate photography, xerography, electronic art (video & computer), and the digital/laser image processing systems in the new color copiers.

The current marketplace reflects tho maturing color copier technology. The switch, by some makers, from light-lens to digital copying has had an enormous impact on not only the machine's capabilities, but also it's acceptance in the marketplace. The number of makes and models is increasing steadily, with regular additions to the market. Business Week (February 13, 1989) called color copiers "expensive curiosities, holding only 2% of the market", but expected that "their sales will rise tenfold, to $1.6 billion, by 1992". Subsequently, Business Week (September 4, 1989), highlighted the Colorocs color copiers with an article titled "A Rosy Future in Cheap Color Copies". Increasing use by the public, as well as artists & designers, reflects the growing general market acceptance.

The laser scanning technology in some of the new 'smart' color copiers offers greater versatility, resolution, and user control. Digitization is the key to color and image flexibility. laser scanners 'read' the image, capture the image digit-by-digit, and process the information by computer. The 'smart' copiers reproduce full color and offer startling control of color and image change, combination and organization.

ln marketing its Color Laser Copier (CLC), Canon claims the 'world's first digital full color plain paper copier'. investment in research and development resulted in a machine that likely has the widest range of capabilities of those now on the market. For instance, the Canon CLC copies with a resolution of 400 dots per inch, and 256 gradations. lt will scan, reproduce, store in memory, and specifically place in an image, any color shown to it through the copyboard glass. The CLC has a four color rotary development system, including black as well as cyan, magenta and yellow. The added black is significantly richer than the mixed black in the earlier three color systems.

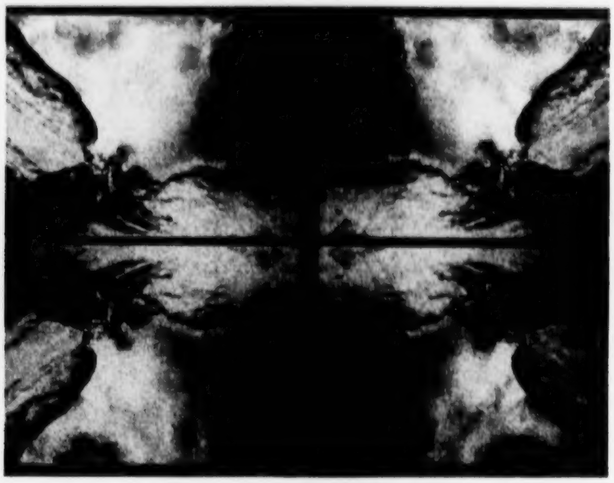
With the CLC, one begins with flat copy, a color slide, a color negative, or objects on the copyboard glass. The original can be color converted, reversed, shifted, recomposed, blanked, framed, enlarged or reduced. A touch panel display accesses the operations. The electronic pointer on the image editing unit allows further control. The artist or designer is free to 'paint' without numbers, to sharpen or stretch an image, and to change the image, color, or composition. The color print emerging from the copier takes form on copier paper, other papers acceptable to the machine, a transparency, or transfer paper. The latter adds another dimension which allows the image to be applied to cloth, plastic, and various other papers and surfaces. While the largest paper print produced by the machine is 11" by 17", the CLC also 'divides up' an image and produces a multipage enlargement of up to 44" x 68".

The assortment of full color copiers on the market is increasing steadily. The Sharp CX5000, Ricoh, Canon CLC. Kodak 'Color Edge', Konica Color 7, Seiko Mead Cycolor 3000, Brother CC5500, Xerox 1005 are in use. New are the Sharp CX7500, Savin Prism I, and the Canon CLC500. Xerox expects again to be a strong contender, and may discard the light lens technology in the 1005 For digital laser technology. The newest Canon (CLC500) offers 400 dpi, 256 gradations for each color, accepts prints, slides, negatives, TV signals, camcorder, video & still video input, and GPIB computer connections. Changes like this will permanently affect the concept of color image reproduction.

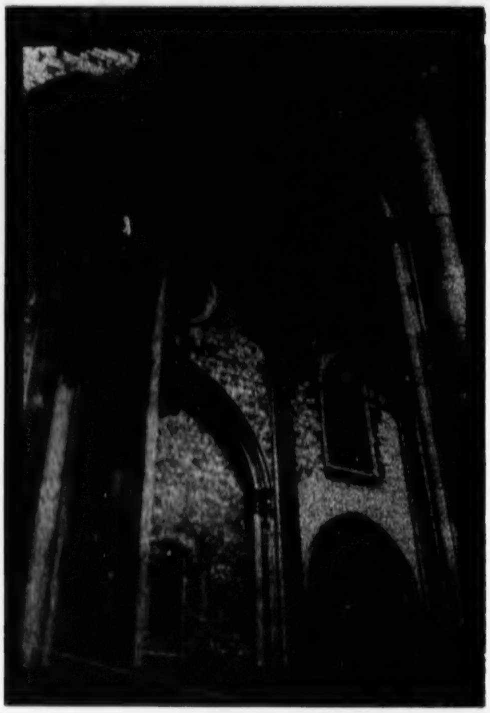
The price of full color copiers varies greatly. Current prices quoted this author ranged from $6,000 to $60,000. Functions and speed (copies per minute) occupy as great a range as price. Individual copy prices from printshops with color copiers average approximately $2.50 a print.

When is a full color copier cost effective? The small to modest size editions which artists produce are compatible with the cost per print on copiers. If thousands of copies are needed, then color separations & printing are a logical route. For extensive experiments in color and form modulation, the color copiers are efficient. They function well for design work, singular images, and small editions. The student of color could use a copier as a color lab. The ability to quickly produce extensive revisions of color and composition offers an efficient alternative to hand rendering. For the artist, designer, or photographer it is a natural extension of the traditional processes. The creative uses of this technology are ready to be fully explored. The full color copier will cease to be a 'curiosity' and become one more art tool that we'll wonder how we managed without having BCC (before color copying).

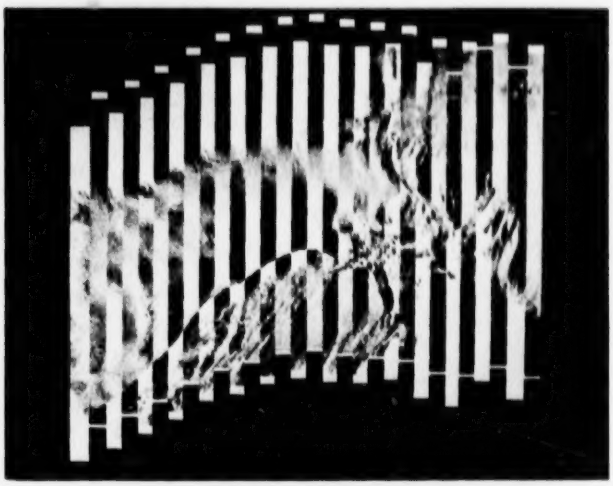
Following are illustrations of a few of the image manipulations that can be generated on a digital laser copier.



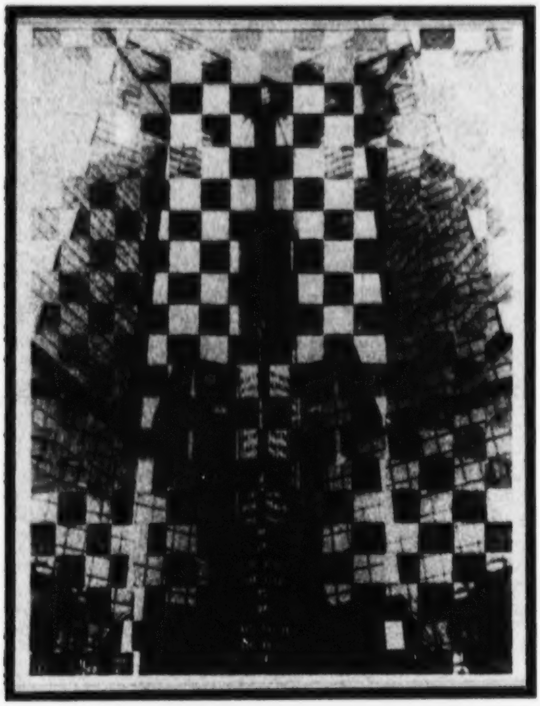
Australian Stream II
(multiple mirror images)



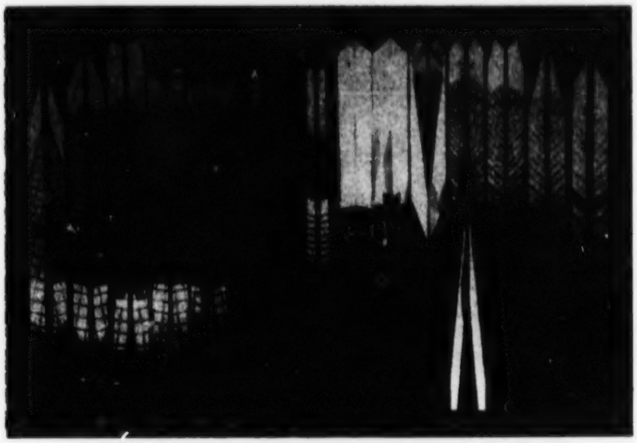
Lisbon II
(shaped & echoed transfer)



Australian Passages
(negative/positive interchange)



Denver Weave
(mirror images interlaced)



Denver Reflections I
(negative/positive interchange)

VIDEO REPORT CARDS: A VISUAL COMMUNICATION METHOD FOR SUMMATIVE EVALUATION

Don Sneed
K. Tim Wulfemeyer

Many researchers have charged that the traditional, printed report card is an inadequate method for reporting information about a student's performance(Brodinsky, 1972; Chansky, 1975; DeSpain, 1973; Giannangelo, 1975; Malcolmson, 1985; Patterson, 1976; Powell, 1980; Walling, 1975). For example, Shedlin(1988) found that "report cards have become so quantitative and narrowly focused that their information potential is rarely realized." He also criticized report cards for not reflecting "creativity, curiosity, perserverance, flexibility, imagination or true thinking ability."

Mehrens and Lehmann(1978) criticized a "marks only" grading system for four major reasons:

(1)It is inadequate for reporting certain competencies.
(2)It is sometimes not related to many important course/school objectives.
(3)It can produce detrimental side effects--feelings of failure, excess competitiveness, cheating and too much emphasis on getting a good grade rather than learning.
(4)It is inadequate for effective communication between home and school.

Mehrens and Lehmann suggested that all "single" grade reporting systems are inadequate for meeting the important objectives of student evaluation. They advised supplementing the traditional, printed report card with such methods as letters and conferences.

The development of computer-generated report cards has brought more calls for improvements. Fleming(1988) reported that "computer-generated report cards must be analyzed, evaluated, explained and acted upon in the same manner as any other professional report." Simply filling in a letter or number bubble is not an adequate method for reporting student performance and progress.

The purpose of this study was to attempt to improve the traditional printed report card for college journalism students by producing and evaluating the effectiveness of video report cards(VRCs).

Quality summative evaluation of a student--the determination of a final grade--is important for at least three major reasons(Mehrens and Lehmann, 1978):

(1)It summarizes various formative evaluations. Formative evaluations include such things as test scores and graded assignments. Such evaluations are designed to facilitate further learning by informing students of their progress while instruction is taking place.

(2)It provides guidance. A comprehensive final evaluation of a student's performance and progress can be helpful for a student's long-range planning.

(3)It provides motivation. Thorough, honest and insightful evaluation can motivate a student to work harder to increase knowledge and improve skills. Evaluation can take the form of friendly encouragement, mild chastising or even harsh criticizing designed to instill at least a small degree of fear of future failures.

Whatever form grading or marking takes, most experts agree that it is best when it is an honest "confrontation with reality in an atmosphere of warmth and acceptance" for students, instructors and other interested parties(LaBenne and Greene, 1969). Such honest and sincere reality checks help students develop accurate self-concepts and provide important information for others as well.

There are at least three major groups of people, besides students, who can benefit from quality summative evaluations: parents, educators and prospective employers(Mehrens and Lehmann, 1978). Parents want and need to know how their children are doing in school. Parents usually play important roles in the educational and vocational planning of students, so parents need to know the academic strengths and weaknesses of their children. Few parents have much contact with schools, especially colleges and universities, and many schools do not do a very good job of explaining course or program objectives, so better summative evaluations could do much to improve relations between home and school.

Educators--teachers, counselors and administrators--can benefit from the task of preparing formal, summative evaluations, because, if done properly, the process promotes a careful examination of student achievements, course goals and objectives, assignments, methods and resource materials. Such introspection can result in better teaching and better evaluation systems.

Prospective employers can profit from quality summative evaluations in at least two major ways. They can obtain more detailed information about a person's abilities and limitations and they can better identify those institutions that are best preparing students for careers in the real world.

At the elementary, junior high school and high school levels, grade reporting is a complicated process, but it becomes even more complicated at the college-level. College students are adults and many of them are no longer living at home. Grades are sent to students, not parents. Despite these realities, many parents continue to make financial and other contributions to their children and many want to know how their children are progressing in college.

One way to improve the traditional, grade reporting process and involve parents more in what goes on at colleges and universities is to produce and distribute video report cards. VRCs offer both aural and visual messages. As a form of "machine-assisted interpersonal communication," VRCs combine characteristics of interpersonal communication and mass communication(Dominick, 1987). They allow the sender and receiver of modified "face-to-face" communication to be separated by time and distance. They give an "electronic permanence" to interpersonal messages. They make it possible for parents to see and hear instructors, plus scenes of class activities, exercises and assignments.

The "you are there" dimension of video report cards can help improve lines of communication, because it conveys a sense of immediacy and allows a communicator to maintain eye contact and "mind contact" with the intended receivers of his communication(Rhodes, 1971). The "powerful sensations of experiencing the reality of the situation" that result from seeing and hearing people, places, things and actions plus the changing image that occupies the visual sense and demands attention can do much to enhance the communication process(Ciano and Carne, 1982; Lentz, 1982).

Video report cards allow educators to employ some of the latest technological advances in communications. This is especially important because we live in a visual world. In addition, as Adler has pointed out, one of the most significant scientific breakthroughs in the past 50 years, in terms of impact on our lives, has been the revolution in communications technology and it is important for educators to keep pace with the rapid changes taking place in the Information Age(Adler, 1982). Hamm and Adams(1987) have gone so far as to suggest that "changing teaching strategies...and creating and manipulating video images is part of the future."

One purpose of this pilot study was an attempt to enhance the grade reporting process through the use of telecommunications technology; however, the main purpose was to produce a set of video report cards for the parents of a small group of college journalism students and then determine the perceived effectiveness of such cards.

RESEARCH QUESTIONS

1. How effective are video report cards for college students?
2. How effective might video report cards be for students in high school, junior high school and elementary school?
3. What are the advantages of video report cards?
4. What are the disadvantages of video report cards?
5. Are there any differences in the perceptions of mothers and fathers regarding video report cards?

METHODS

Near the end of a 15-week, Fall, 1988 semester course in editorial and critical writing at San Diego State University, students were asked if they wanted to have a video report card detailing their performance in the course sent to their parents. Fifteen of the 20 students volunteered, furnished their own blank tapes and agreed to either take the video report cards home or have them mailed to their parents. Since student grades are mailed to students rather than parents, asking for volunteers ensured that student privacy rights were not violated.

Of the five students who did not volunteer, two received final grades of F, one received a D, one earned a B and another earned an A. The grades for the 15 who volunteered were: 4 A's, 8 B's and 3 C's.[1]

In addition to the video report cards, questionnaires were distributed to parents. Parents were asked 17 questions designed to elicit their evaluations of the effectiveness of video report cards as a method for communicating information about grades and the process of assigning grades. A self-addressed, postage-paid return envelope was provided.

The video report cards were made at the home of the instructor for the course, so they lacked studio-quality production values. Each tape was approximately 25 minutes long. The first five minutes of each tape featured the rationale for producing video report cards and an overview of the course. The rationale included telling parents that a video report card is an attempt to bring the university and the community closer together because most parents have very little contact with the university that their children attend.

Furthermore, parents were told that a video report card allows for a more thorough, "personalized" explanation of why a grade has been assigned than does a typical, printed report card. Finally, parents were told that a video report card is an attempt to improve the student evaluation process by utilizing advancements in communications technology.

After the standardized rationale and overview, the next five minutes of each tape consisted of excerpts from class activities. Brief clips from the field trips, guest speakers, video tapes and books, movies, concerts and art exhibits that were reviewed were edited together in this segment.

The final 15-20 minutes of each video report card was "individualized" to provide an analysis of how a student's grade was assigned. Copies of graded papers with the instructor's comments were shown and the instructor discussed the strengths and weaknesses of a student's writing, suggested areas that needed improvement, cited areas where improvement had occurred, and identified problems with writing mechanics, story organization, information gaps or unanswered questions.

This portion of the tape also noted especially creative or effective writing and/or other contributions the student had made over and above what was necessary. Finally, the instructor addressed late assignments, lack of effort, absenteeism and perceived underachivement.

The questionnaires contained 11 five-point Likert-type items. Response range was "strongly agree" to "strongly disagree." For the results reported in this paper, the "strongly agree" and "agree" categories were combined and so were the "disagree" and "strongly disagree" categories.

In addition to the quantitative portion of the questionnaire, five open-end questions were included. The more qualitative questions asked parents to comment on what they liked best and least about their child's video report card and whether they planned to keep it.

Questionnaires were returned by 57% of the parents.[2]

FINDINGS AND DISCUSSION

About 95% of the parents said video report cards were a good idea for college students. (See TABLE 1) Parents were not so enthused about the prospect of VRCs for other students, though. About 80% of the parents thought VRCs would be a good idea for high school students, about 60% thought they would be good for junior high school students and about 40% thought they would be good for elementary school students.

Generally, mothers tended to like the idea of video report cards more than did fathers. For example, all of the mothers and 88% of the fathers liked VRCs for college students. About 88% of the mothers and 63% of the fathers liked VRCs for high school students.[3]

More than three out of four parents felt video report cards were an improvement over the traditional, printed report cards. About 90% of the parents thought the regular, printed report card provides too little information about how a grade was assigned. Almost 95% indicated that the VRC helped them better understand the subject area their child was studying.

About 40% of the parents wanted to receive both a printed and a video report card. About 80% expressed the desire to have VRCs for all of their children and 65% said they wished they had been given VRCs for the courses they took in school.

Generally, in their responses to open-end questions, parents praised the concept of video report cards and acknowledged the effort that it took to produce the VRCs. Every parent indicated that the VRC would be kept. Comments included:

"It's a keepsake."

"I plan to keep it forever, make copies for grandparents and replay it whenever I fee unsure of my contribution to the world."

"Keep it by all means."

Some parents appreciated the teaching/grade reporting innovation of video report cards. Comments included:

"I sincerely hope you have set a precedent that will become common practice. It is refreshing to find teachers who are not tradition bound, but who are seeking and willing to be innovative."

"The whole idea is so novel. I would like to show it to teachers we know to hear their comments."

"I think this is a great technique and wonderful vehicle to communicate to the parents about their child in college."

TABLE 1

Perceived Effectiveness of Video Report Cards by Sex of Parent[A]

STATEMENT	PARENTS (N=17)	FATHERS (N=8)	MOTHERS (N=9)
VRCs are a good idea for college students	94% (1.3)[B]	88% (1.5)	100% (1.1)
VRCs are a good idea for high school students	77% (1.9)	63% (2.3)	89% (1.6)
VRCs are a good idea for junior high school students	59% (2.5)	50% (2.8)	78% (2.2)
VRCs are a good idea for elementary school students	41% (3.0)	38% (3.3)	56% (2.7)
A VRC is an improvement over a printed report card	82% (1.8)	75% (1.6)	89% (1.5)
A VRC helps me understand what my child is studying	94% (1.7)	88% (1.6)	100% (1.2)
Printed report cards offer too little information about grades	88% (2.1)	75% (2.2)	100% (1.9)
A VRC and a printed report card should be issued to parents	41% (2.9)	38% (3.0)	56% (2.2)
I'd like VRCs for my other children who are or have been in school	82% (2.2)	75% (2.3)	89% (1.9)
I wish I had VRCs for courses I took	65% (2.4)	62% (2.4)	67% (2.1)

[A] Percentages of "agreement" with statements. "Strongly Agree" and "Agree" responses were collapsed.

[B] Range 1-5. Lower the mean, greater the agreement with statement.

Some parents indicated that the video report cards might even have a ripple effect--a kind of motivation for others. Comments included:

"Not only will I share it with my colleagues, but I feel my son who is in high school was motivated to strive for higher scholastic achievement after viewing his sister's progress in college."

"Later in life, my son may like to show it to his children."

Some parents commented on the form and content of the video report cards. Comments included:

"Thank you for the extra time and interest you have contributed to our son's education. A teacher is certainly rare who goes beyond the immediate subject to strive for the development of a student's attitude and character. Your evaluation of our son was so accurate it was uncanny. We plan to review the tape with our son to point out your confirmation of our opinion of his work attitude and skills. My hand and heart are out to the person who stood or sat and held the cotton pickin' camcorder while you expounded on a whole class of students."

"The explanation of what the course entailed was the best part of the video report card. It's great to see someone who is not married to the computer and to true-false questions."

"I had a clear picture of what the class was about, the assignments required and how my daughter was progressing. I also liked meeting the teacher through the video."

"This is the first time I've been given the opportunity to 'see' one of my son's instructors and make an evaluation for myself of his competency and personality. I hope I can continue to receive his grades in this manner."

"It is helpful to me since I'm a parent outside the household and don't get a regular opportunity to share in my daughter's progress."

"What a wonderfully creative way to encourage parental participation in the growth of children."

Some of the unfavorable comments made by parents about the video report cards dealt with the impracticality of creating VRCs for each member of a large class. One parent, who was a third grade teacher, said he was already required to provide lengthy comments on printed report cards, so he did not see the need to spend the time creating VRCs.

Several parents criticized the poor tape quality of the video report cards; however, one parent said the quality of the tape, noises from planes and children and less-than-perfect lighting did not detract from the VRC, but actually served as examples of the instructor's sincerity in producing it.

About one-third of the parents said the tape was a bit too long. A few parents suggested that the pace of the tape was a little slow, especially at the beginning.

CONCLUSIONS

Video report cards were favorably received by almost every parent surveyed. In addition, almost all of the students who requested a VRC expressed an appreciation for them. Hence, the investment in time, energy and resources needed to produce VRCs seems justified.

One of the greatest benefits of video report cards may be their ability to enhance the outreach programs of colleges and universities. VRCs can provide an important link between the people in the community and the college or university.

Too few parents have an opportunity to interact with or even meet professors. While it's true that VRCs are examples of linear, one-way, machine-assisted interpersonal communication, they do allow parents to find out quite a bit more about what their children are doing in college than do traditional printed report cards. And, when questionnaires are included as part of the package, a viable feedback loop is added and the one-way communication dimension is diminished somewhat.

Even though the idea for video report cards for college journalism and mass communication students seems to be a good one, VRCs probably are not practical for all courses. Because of the time necessary to create them, VRCs seem best suited for low-enrollment courses--fewer than 20 students. Because of the need to really "know" students and to have tangible examples of student performance, VRCs seem best suited for skills courses where instructors can evaluate a student's ability and aptitude based on concrete, "real-world" writing, reporting, editing and production projects or assignments.

While parents seem receptive and appreciative of video report cards for college students, they do not seem to think VRCs would be as effective for children in elementary, junior high or high schools. This may indicate that perhaps parents feel they know more about K-12 educational programs and teachers than they do about college and university programs and so the more elaborate and complete grade reporting opportunities that a VRC provides are not needed as much for younger students.

In general, mothers tended to react more favorably to the concept of VRCs than did fathers. None of the slight differences between mothers and fathers on any of the variables was statistically significant,however.

The technology-related problems associated with the production of video report cards cannot be overlooked. Not everyone owns a video cassette recorder(VCR); however, with VCR penetration approaching 70% of the households with televisions, even parents who do not own a VCR likely will know someone who does and so will have access to one. In those cases were a VCR is not readily available to parents, perhaps an instructor could create an "audio report card" or write the parents a letter.

Instructors might encounter some problems obtaining and using such taping equipment as cameras, lights, microphones, tripods, editing systems and props. As Tamashiro and Campoy(1988) have noted, "The dominance of new technologies such as computers, interactive video and electronic communications poses a dilemma for schools: On the one hand, educators want to use these technologies in the curriculum. On the other hand, they are obstructed by limited budgets, lack of expertise and even resistance to technology."

Such problems can be mitigated in a number of ways, though. Campus media center equipment can usually be used for little or no expense. Help and advice from experts is usually available on most campuses for little or no expense. How-to workshops are often offered by campus media centers, local video stores and by extension or adult education programs. Reading owner's manuals and simply practicing with equipment can also help overcome a lack of knowledge and experience with video equipment.

The experience that comes with practice will likely help lessen the impact of another problem that surfaced in this study--poor production values. The VRCs in this study lacked studio-quality production values. Some shots were unsteady, the lighting was uneven in spots, there was some tape breakup occasionally, the audio levels were not always consistent, background noises were sometimes distracting and there were occasional editing glitches.

A tripod, studio lighting and controlled audio would have made for a much superior product. As Hamm and Adams(1988) suggest, "To communicate to a target audience requires an understanding of visual aesthetics, message design, video technology and the characteristics of effective instruction."

Another critical point is that instructors need to begin taping appropriate course-related activities and evaluations from the very first class meeting. Ideally, if tape supplies are sufficient, a different tape should be used for each activity--guest speakers, field trips, in-class assignments. Having a set of tapes rather than a single master tape will facilitate easier and faster editing when it comes time to create the individual VRCs.

Despite the amount of time, energy, assistance and resources required, despite the difficulty and expense of obtaining and using the necessary equipment, despite the fact that not everyone has a VCR, and despite the fact that video report cards may not be practical or effective at all levels of education and/or for every class, the parents of college students in this survey overwhelmingly approved of the concept of video report cards. Such a response warrants further study and experimentation with VRCs as a method for improving the reporting of grades for students enrolled in college-level journalism and mass communication courses.

NOTES

[1] The average grade in upper division courses in the Department of Journalism at San Diego State University is a B. The editorial and critical writing course traditionally attracts some of the best students in the department.

[2] Some students indicated they lived in single-parent households and could not guarantee that out-of-household parents would see the VRC and/or complete the questionnaire. In addition, some students indicated that their parents might return a single questionnaire to represent the "family" view rather than return both questionnaires.

[3] None of the mother-father differences on any of the variables was statistically signficant. (See TABLE 1)

REFERENCES

Adler, R. P. (1982, Winter). California's communications revolution. Cry California, p. 19.

Brodinsky, B. (1972, November). Policies on the report card: Keep it? Change it? Updating School Board Policies, pp. 1-4.

Chansky, N. M. (1975, Fall). A critical examination of school report cards from K-12. Reading Improvement, pp. 184-192.

Ciano, J.M. and Carne, E. B. (1982). Telecommunications: The next generation. Communications and the Future: Prospects, Promises and Problems. H.F. Didsbury Jr.(ed). Bethesda: World Future Society, p. 145.

DeSpain, B. C. (1973, Spring). Telling parents about their children. Catalyst for Change, pp. 20-21.

Dominick, J. R. (1987). The Dynamics of Mass Communication. New York: Random House, pp. 12-16.

Fleming, D. J. (1988, April). Report card follow-up: Going beyond the facts. NASSP Bulletin, pp. 50-52.

Giannangelo, D. M. (1975, May). Make report cards meaningful. Educational Forum, pp. 409-415.

Hamm, M. and Adams, D. (1988, January). Changing gateways to knowledge: New media symbol systems. TechTrends, p. 20.

Hamm, M. and Adams, D. (1987, January/February). Teaching students critical viewing skills. Curriculum Review, p. 30.

LaBenne, W. D. and Greene, B. I. (1969). Educational Implications of Self-Concept Theory. Pacific Palisades: Goodyear, pp. 28-29.

Lentz, T.M. (1982). The medium is the madness: Television and the psuedo-oral tradition in America's future. Communications and the Future: Prospects, Promises and Problems. H.F. Didsbury Jr. (ed). Bethesda: World Future Society, p. 330.

Malcolmson, B. (1985, Winter). Reporting to parents: An individualized computer-based approach. Canadian Journal of Exceptional Children, pp. 59-62.

Mehrens, W. A. and Lehmann, I. J. (1978). Measurement and Evaluation in Education and Psychology. New York: Holt, Rinehart and Winston, pp. 594-629.

Patterson, J. L. (1976, August). Computerized report cards. Educational Technology, pp. 39-42.

Powell, T. H. (1980, October). Improving home-school communication: Sharing daily reports. Exceptional Parent, pp. 24-26.

Rhodes, L.A. (1971). The role of television in education. Instructional Television. R.C. Burke(ed). Bloomington: Indiana University Press, pp. 2-3.

Shedlin, A. Jr. (1988, May). How about a national report card month? Principal, p. 34.

Tamashiro, R. and Campoy, R. (1988, May). An interdistrict program to expand technology use in schools. Educational Technology, p. 35.

Walling, D. R. (1975, January). Designing a "report card" that communicates. Educational Leadership, pp. 258-260.

CRITICAL THINKING-VISUAL THINKING APPLICATIONS FOR RESEARCH AND PRODUCTION

Eleanor P. Gnizak
Rita Girshman

If you were to select any classroom at random and remain there for a week or so, it is virtually certain that you would hear the teacher say: "Now I want you to really think." Few teachers, however, ever really explain the process of thinking, and fewer students understand what it is that they are expected to do when they are directed "to think."

The importance of having students understand what the teacher means by the statement, "Now I want you to really think," has become a priority in many school systems. The Howard County Maryland School System is no exception , and a program we developed as one possible opportunity for teaching critical thinking skills required adjusting a previous visual literacy unit. The authors, an English teacher and a media specialist, had worked closely for a number of years perfecting a visual literarcy program with ninth and tenth grade gifted and talented students, as well as with average 12th grade students. Although we had achieved a great deal of success with our program, we were constantly adjusting our lesson plans and felt a certain need and desire to capitalize on the potential of our program to increase the critical thinking skills of our students.

We were able to take advantage of the fact that Dr. Antoinette Worsham, a leading advocate of the inclusion method of teaching critical thinking, was the Language Arts Supervisor in the Howard County Maryland Public School System and was more than willing to advise and encourage our efforts. During our initial discusion with Dr. Worsham, she stated that most teachers actually do teach the thinking skills but rarely share or verbalize this process with their students. Dr. Worsham agreed that the inclusion method of teaching thinking could be easily adapted and included in any school program. This method blends the covert teaching of thinking through focus and application lessons (Worsham, 1988). After the meeting with Dr. Worsham, we realized that with a minimal amount of planning we could adapt and connect the critical thinking skill of summary with the concept of visualizing research. We had worked with students in the area of visual research and documentary production since 1984 (Gnizak and Girshman, 1984). We decided that we would combine the teaching of thinking, using the recommended series of focus and application lessons, with the ubiquitous research paper, and present the combination in a visual medium to maximize motivation and capitalize on student interest. The contemporary student is visually much more literate than previous generations. The experience that these students have had with the visual world is clearly beneficial for this unit. We were able to capitalize on this previous experience, and the students enjoyed the visual thinking used as motivation for the unit, and understood the connection with criticial thinking skills. Even though the enjoyable connection between visual perceptions and the thinking process does not usually extend to the research process, we were determined to change that attitude.

Thus, the obvious starting point was threefold: to match the requirements of the curriculum, to identify an important thinking skill involved in the reseach process, and to blend in a visual product. In planning the steps of the program we discovered that critical thinking skills, research skills and visual skills were interdependent. It was impossible to complete the objectives of the unit without using all three skills concurrently (fig. 1).

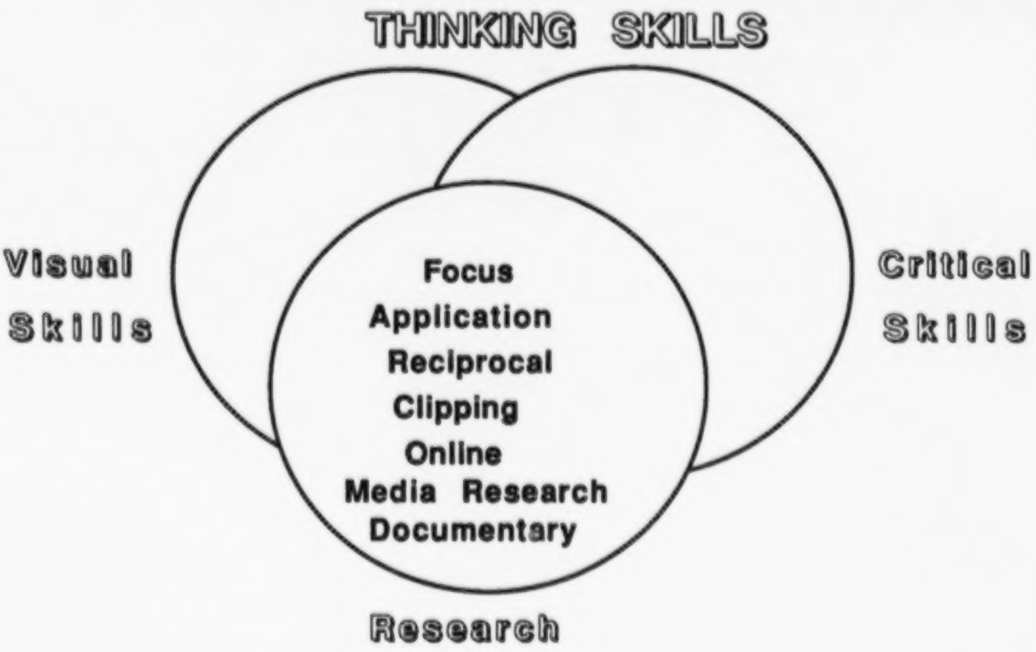


Fig. I Thinking Connections

Two classes of 12th grade students were involved in the ten-week program. Each class consisted of approximately 28 students and, at all times throughout the unit, the students worked in cooperative learning teams of four students (Slavin, 1981). The students were aware from the very beginning that they would be involved in a series of lessons that would combine critical thinking/research/visual literacy skills.

Since the requirements of the curriculum were obvious, during the planning stage of the unit our only decision involved the selection of the critical thinking skill on which we wanted to concentrate. We considered assumption, inference, deductive and inductive thinking, among others, but finally decided on the skill of summary because many of the other skills are directly related to the ability to summarize. We decided to introduce this skill through several focus lessons (Worsham and Stockman, 1986). Our goal was to have students synthesize information presented and sequence the mental processes used in summarizing. During one of the focus lesson, we distributed one of the following possible pantomime situations to each of the cooperative-learning teams:

- an old person, irritated and a bit worried, sitting on a bus in the middle of a group of noisy teenagers
- two young children, guilty and frightened, sitting in the principal's office after throwing a rock through a school window
- two teenagers, in a rush, trying to open a jammed school locker
- an angry mother, rushing into her daughter's room, and scolding the teenager for monopolizing the family telephone
- two students, sitting in the principal's office, trying to explain why they threw a snowball through a school window
- a young person, bored and trying to fend off sleep, sitting through a particularly dull class but trying to appear alert because he is already getting a bad grade
- a teenager and friend who have been speeding are stopped by a policeman and try to avoid a ticket and a phone call home to parents
- a teenager attempting to copy his friend's homework without the teacher finding out

One student in each group was the designated recorder for the group. The recorder was to list all of the steps that the group would take in order to present the pantomime. The recorder was also instructed to record the group's response to pantomimes performed by the other teams in the class. As the groups prepared to present their pantomime, the other groups were given the task to infer the age, attitude or emotions, and the basic situation that other teams were presenting. Groups were told to be prepared to describe the situation in as few words as possible. The recorders for each team recorded all of the steps that the groups took in order to reach concensus. We followed this same basic lesson plan while students synthesized information presented in advertisements and photographs. As each lesson finished, students discussed what they had seen and the process in which they had engaged. In all cases, the students were able to characterize their activities as one of synthesis or summary.

In our final focus lesson, our objective was to have the students generate and refine a working definiton of the the thinking skill of "summary." Working in the teams of four, we told the students that they would be looking at visual images and the recorder for each team should write down the team's perception of the basic meaning of each picture. Students viewed pictures of atmosphere/mood and conflict and each recorder wrote down in a brief, clear, and organized fashion the basic meaning of each picture (Scribner Laidlaw, 1988). The teams shared statements with the entire class and noted similarities and differences.

An additional focus goal was to have the students sequence the mental processes used in summarizing. In other words, we wanted the students to verbalize the steps used in the process. Each team was given magic markers and chart paper on which to record its definition and the steps necessary to achieve summary. When all of the posted definitions and steps were scrutinized, similarities among the teams were obvious and it was relatively easy to agree on one class definition. The following illustrates a class definition of the critical thinking skill of "summary" and steps in achieving a summary:

Summarize - Definition
To summarize means to shorten a passage to about one-third of its original length.
The purpose of the summary is to condense the original without sacrificing its basic meaning.
To summarize is to present the substance in a condensed form.

Steps
1. Observe/view or read the original selection.
2. Locate the main idea or ideas.
3. Determine and maintain the tone of the original.
4. Omit irrelevant material, unnecessary details.
5. Reduce the material to about one-third the length of the original .
6. State the main idea and the important points in the exact order the original.
7. Review and revise where necessary.

While the inclusion process advocates teaching thinking skills through direct instruction , the model also suggests a structured procedure for application of the thinking skill to achieve mastery (Worsham and Stockton, 1986). Thus, after the initial focus lessons, two to three class days were allocated to the first application lesson still blending the visual literacy skills with the thinking skill of summary. For this lesson, we used the reciprocal teaching technique which includes four major steps: summary, question, clarify, and predict (Kapinus, 1986). The teacher introduces, explains and models the four strategies of reciprocal teaching. After students understand the purposes and techniques of the strategy, they are invited to "become" the teacher and use the strategies on new text materials. Still working in the original cooperative learning teams, each member of the four-member team was given a different article to peruse for the reciprocal teaching assignment. The summary task was an easy application of the critical thinking skill that the students had just focused on, while the question section relied on the highly visual think-trix with which students were also familiar (Lyman, 1987). Students apply the reciprocal teaching strategies to their particular article and then meet with members of the other teams who have completed the same assignment. Thus, all students who had read the same article compare their application of the steps in the process with other students. They return to their home team and take turns "teaching" the article to their team.

Any textual material could be used for this application lesson, but for the purposes of this unit we relied on articles that were directly related to critical thinking/visual thinking/research and the following student-written lesson illustrates the ease and the importance of combining research with seeing and thinking (D'Ignazio, 1988):

Sample Student Reciprocal Teaching Lesson

Student lesson on Fred D'Ignazio's "Bringing the 1990s to the Classroom of Today." Douglas Bradley graduated from Mt. Hebron High School in 1989.

Summary

The high tech world of electronics is coming to the classroom sooner than we think. I have been travelling throughout the country teaching teachers how to use this technique This technique of teaching makes allowance for experimentation, mistakes, cooperative learning and linking classrooms. This high-tech work station includes an Apple II Computer, tape recorder, video camcorder, VCR and TV monitor, all on carts. During the sessions the teachers are divided and assigned a task where each adds his/her own insights.

This system will also allow students to link classrooms with one another across the world. They will be able to share papers and projects with thousands of other students, thereby giving them more incentive to work harder. The key points for the program's success include: cooperative learning techniques (teams work together to produce a final product); pride in authorship (teachers and students are eager to share their new ideas and techniques); self-directed learning. The process is simple and can be spread easily. The equipment should not be a problem since the equipment suggested is cheap and many schools already own much of the equipment.

Some new results are video term papers, book reports, radio documentaries, science experiments, electronic slide shows, animation of math word problems, publications, banners and much more. Finally, its mobility allows it to be accessible to all.

Questions (Based on Frank Lyman's Think-Trix)

Recall:	In what ways will students use this techinque?
Comparison:	How are the sessions similar to the way students are taught today?
Contrast:	How does this technique differ from current teaching methods?
Cause/Effect:	What benefits will this method have on students and the future of society?
Idea to Example:	In what ways will this system benefit students? In what ways might this discourage independent thinking?
Example to Idea:	What are some characteristics of this teaching technique? What is the purpose of this new teaching technique?
Evaluation:	Will this method cause a socially -reclusive society solely dependent on video technology? Will this system eliminate the need for teachers? Will this system create a generation of non-independent thinkers? Will this technique withstand the test of time, or will it become less exciting with time?

Clarifying (Check to see if there are any words or anything else in the text you or fellow classmates might not understand.)

1. prestigious
2. digitizes
3. accreditation
4. Califone record player
5. collaborative

Predict

1. Computers and video cameras will be used along with cassete players, record players, TV's and VCR's in most schools and classrooms of the next decade.
2. These computers and video camers will be outdated in the 21st century probably by other things invented in Japan.
3. The technique itself will be replaced by other techniques not yet devised.

This particular student-generated lesson involved a lively discussion. Of particular interest to the students was the question relating to independent thinking and the danger posed by too much reliance on another's viewpoint and/or expertise. The possible manipulative power and the inherent threat to future generations who might be more victimized by visual technology created an impetus and a desire to learn more about the link between critical thinking/ visual literacy and research.

At this point, the entire class brainstormed a number of topics that would lend themselves to research and to a visual depiction of that research. Teams were allowed to select any of the brainstormed topic and each member of the team had to focus on one aspect of the topic. For example, if a team had chosen the smoking topic members of the team might chose to focus on : economics and smoking, the addictive personality and smoking, the power of the smoking lobby, commercials and smoking and/or any number of related topics. The students chose topics on the justice system and rape, the growing danger of gangs, the prevalence of human error and accidents, and the psychology of commercials, as well as other topics dealing with current social problems.

Once the teams had selected a topic, we were ready to move on to the next application of the critical thinking skill of summary. In preparing for this particular application exercise, we had accumulated several months worth of newsmagazines and newspapers. After student topics were approved, students were allowed to clip from our accumulated stack of periodicals as many article related to their chosen topic as they could find (Minnich and McCarthy, 1986). They pasted these articles on one side of notebook paper in a looseleaf notebook. On the other side of the clipping, the students wrote the proper bibliographic entry and a brief summary of the clipping. The purpose of the assignment was to develop and reinforce the critical thinking skill as well as to give the students the opportunity to accumulate research data for use in their written research paper. Directly related to the clipping thesis exercise was the online preliminary strategy and the completion of forms needed before the students could take part in an online search. Here too the students had to summarize their topics into a one-line summary statement in order to tap into a variety of databases pertinent to their particular topic. All of those activities reinforce the connection between critical thinking/visual thinking and research and lead into the written research paper.

Although all of these students were seniors and had written research papers before, they had never written an abstract of their papers before. This time their task was to complete an abstract of their research paper and share their abstracts first with their teams and then with the entire class. At this point, the teams had to decide how they would adapt their papers into a visual statement. Teams had to chooseone person's paper for the focus of their documentary, or they had to select portions of the paper, or they had to perhaps do some additional research before they were ready to visualize their research.

Once teams had made all of their decisions, they were able to choose from a variety of visual medium to communicate their particular message: sound/slide or video. All of the students involved in this project chose a video tape production. Still working in teams, the students outlined their documentary and wrote a preliminary script (Edmonds, 1978). They also discussed interview possibilities and scheduled some of the interviews for the video research report.

At this stage, the media specialist appears with a series of handouts that are crucial to the development of a quality product. These printed materials cover the following important areas:

- individual responsibilities-producer, script writer, technical director, camera person, graphics, music, editor
- production summary calendar
- setting up the interview-lights, microphones, tape recorder
- storyboard
  - types of shots
  - camera movement
  - camera angles
  - the sound track: narration, interview, dialogue, music, sound effects
  - graphics: original, copy art, computer graphics
  - visuals
- editing: sequence, transitions, length
- evaluation of production.

The students were briefed by the media specialist on the specifics of production. The media specialist worked with the construction of a project design that was shared with other members of the class for critique and suggestions. During this project design construction, the media specialist emphasized the stages of the actual documentary film production including miscellaneous hints for video productions, audio techniques, use of the video camera and, most importantly, planning and writing the storyboard. As a matter of fact, the media specialist insisted that "no camera will be assigned to any group without a storyboard." A quality production is a result of a good storyboard. According to the old expression, "If it's not in the plan, it's not in the can." Of course, many of the groups were not concerned because they had access to a camera.

To insure that the students actually read and understood the material in the handouts they worked in cooperative learning teams and each student was assigned one or two particular handouts to read and summarize. Anyone who has worked with high school students realizes the futility of handing them a ten-page handout and expecting all of the them to read all of the handouts. Thus, working in the cooperative learning group each student is only responsible for reading one or perhaps two of the handouts in detail. The beauty of the reciprocal teaching technique is that each student becomes familiar with all of the handouts and becomes the expert on one or two.

A hands-on experience is crucial at this stage. Working with the video camera, lights and microphones each group had the opportunity to practice using the equipment. While one of the groups gained expertise in camera handling, the other groups worked on the project design, creating storyboards and the visuals needed for the production.

After all of the groups completed the hands-on experience, the students presented a summary of the project design to the entire class for suggestions and comments. What is particularly important at this point is that the project design must be clear to the rest of the class and the major theme of the documentary is thoroughly understood and makes a comprehensive and visual statement . Teams then present a production summary schedule to teachers for review and scheduling for cameras and video room (fig. 2).

Actually the scheduling for cameras and the videotaping for the documentaries did not present a problem because many students have access to cameras and much of the work was done outside of school time. The editing process is something else. Many students find the editing process difficult, not only because it is a difficult skill to perfect, but it is extremely time-consuming and has to be scheduled during school and around other teams and other people in the school who are also doing video projects.

After all of the stages of this visual/critical /research thinking project were complete, the students were eager to share productions with classmates and this sharing was combined with an evaluation of the products. The criteria included:

- production techniques
  - focus, sound track,
  - camera presentation techniques,
  - composition, graphics
- creativity of presentation
- organization of content
- general effectiveness.

A film festival was held for students and parents, at which time "Oscar-type" awards and food all heighten a feeling of accomplishment . In the words of several of the students, "My film is awesome." The teachers feel that this course relating visual/critical and research thinking skills is also awesome.

Production Summary Schedule
Group Name: ____________________

WEEK OF								
1	Concept-Topic							
2	Outline							
3	Script							
4	Storyboard-Visuals& audio - title & credits							
5	Art & Graphics							
6	Set Design & Props							
7	Scheduling-interview locations &rooms etc.							
8	Filming each scene							
9	Editing							
10	Audio Dubbing							
11	Screening							
12	Evaluation							
	COMMENTS							

Fig. 2 Production Schedule

Reference

Edmunds, R. *Scriptwriting for the Audio-Visual Media.* New York, N.Y., Teachers College Press, 1978.

Gnizak, E., and R. Girshman. "Visualizing Research." In A. Walker, R.A. Braden and L.H. Dunker (Eds.), *Visual Literacy: Enhancing Human Potential.* Blacksburg, Va.: Virginia Polytechnic and State University, 1984, pp. 202-212.

Kapinus, B. *Ready Reading Readiness.* Baltimore, Md.: Maryland State Department of Education, 1986.

Lyman, F.T., Jr. "The Think-Trix: A Classroom Tool of Thinking in Response to Reading." *Reading: Issues and Practices,* Yearbook of the State of Maryland International Reading Association Council. Vol. 4. Westminster, Md.: State of Maryland International Reading Association Council, 1987, pp.15-18.

Minnich, N. P., and C. B. McCarthy, " The 'Clipping Thesis': An Exercise in Developing Critical Thinking and Online Database Searching Skills,"*School Library Activities Monthly* II, 8 (1986): 45-50.

Scribner Literature Series. New York, N.Y., 1988. Scribner Laidlaw.

Slavin, R.E. "Synthesis of Research on Cooperative Learning," *Educational Leadership* 38, 8 (1981): 655-660.

Worsham, A. "A 'Grow as You Go' Thinking Skills Model," *Educational Leadership* 45, 8 (1988): 56-57.

Worsham, A., and A. Stockton, *A Model for Teaching Thinking: The Inclusion Process.* Bloomington, Ind.: Phi Delta Kappa, 1986.

FUN WITH PICTURES, PUNS AND AMERICAN IDIOMS--OR MADISON AVENUE HELPS TEACH VISUAL, VERBAL, AND CULTURAL LITERACY

LaVerne W. Miller

In the course of finding pictures in current publications for stimulating writing by students of English as a Second Language, I have come upon a visual literacy game played by advertisers. It is one which many of you may be familiar with, but with which I have become fascinated only during the last several years. It is the combining of a visual and verbal message in such a way that the picture's meaning is made clearer or melts into a verbal statement which supports it in some clever manner. The advertisement assumes a certain kind of a priori knowledge on the part of the viewer which creates a play on words--a pun--or a double entendre that engages the intellect in a subtle secret understanding between the viewer and the unknown creator of the viewer's experience of looking at the advertisement. The visual and verbal languages are intertwined so that one could respond to the picture without the verbal cues, but to respond to the combination is to bring about a feeling of discovery (ah ha!), an awareness which then creates a totally different experience--a feeling of delight in the knowledge that communication has occurred in a very special way, assuming there is prior knowledge or cultural literacy on the part of the receiver. Of course this is flattering to the viewer and an ego booster. Besides which it is fun--like little Jack Horner who puts in his thumb and pulls out a plum and says, " What a good boy am I!"

The verbal language used may be taken from phrases or idiomatic speech commonly quoted in the culture, it may be reference to a line from poetry or other literature, or it may be a pun which is based on an understanding of something special in the language or culture.

It is important to note that with rare exceptions, the impact of the verbal portion of the ad would be lost on people barely familiar with the English language. Such are many of our students. On the other side of the coin is the use of these kinds of advertisements to teach idioms, quotations, or familiar cultural phrases to the students, to familiarize them with these aspects of language and culture. Students can then join in the fun and find their own examples of this advertising genre, to search out their own visual/verbal examples. In some cases they will need also to be cautious about relating the sound of a word, or words, to the picture, which means they will have to pronounce it properly as well. The sound may determine the significance of the play on words.

Many cartoons in the comics assume a priori knowledge which in some cases depends upon a knowledge of language for its effect.

The fact that such subtleties of language appear in current publications and the daily newspaper is an incentive to "get with it" and master some of the expressions that are part of our culture.

The protocol for using such material at our institution is simple. It goes like this: students go to the Learning Lab for such an exercise. To stimulate ideas for writing short compositions the student is given a picture mounted in a plastic cover sheet. On the back side of the sheet are mounted some questions which help him to analyze what he sees. This is an exercise in visual and verbal reading and interpretation. As part of the exercise, he may then respond in writing. He may be asked to explain and describe what he sees and support his explanation by pointing out details in the picture. He may be asked to identify the specific verbal portion of the advertisement and to write examples of his own which support his understanding of it. The staff of tutors in the Lab make up the viewing and writing exercises and we constantly add to the collection. The student must make connections between the verbal and visual; he must engage in analysis which for him requires disciplined thinking; he adds to his vocabulary and becomes more culturally literate as he increases his versatility with the language. Hardest of all, he must express his ideas in writing which will be graded and become part of his recorded assignments. The protocol covers a wide range of ideas and possibilities for learning language, which is the goal of our program in English as a Second Language.

VISUAL LITERACY AND COMMUNICATIONS

Patricia Schallert-Lawrie

Video and education are fast becoming integrated partners within the network of communications. Both have been evolving rapidly over the past 20 to 25 years. Video, which began as supplementary material to fill time in classrooms has recently become legitimate support material for visually based programs within our educational curriculum. Further, current educational frameworks periodically update their video tapes and materials in response to new knowledge and changing needs. Yet, amidst this growth, the manner in which the video medium is used within the classroom has rarely been examined. Studies indicate that approximately 80% of what is learned is acquired through visual experiences. As a result visualization programs have become even more important in the teaching and learning process in recent years.

Fascinating as video may seem, it is the student who perks up at the thought of being able to organize, create, direct, control and finally put together projects that supplement the curriculum concept they have studied. The student wants to use the video as a support to their own educational curriculum skills. It is the teacher, however, who must creatively use the video medium as a hook in the education process.

Today most schools are becoming interested in establishing an ongoing visual literacy program which incorporates different communication and educational frameworks. Progress can be slow because many school network programs remain confused about the systems available and how to use them. Those teachers who use a visual literacy approach within their programs are often bombarded with pamphlets and catalogues on lengthy video tapes, laser disk technology, computer programs and other expensive tools.

For those schools that have gotten their feet wet in this still-young medium, it has been a slow evolutionary process. Glimpsing into the classroom provides a look into the decision- making process: How teachers started using the video medium and how they are using it now. Visualization became popular with "right brain mapping" techniques and video tapes of movies, literature, or lengthy science presentations filling up classroom time.

Recently however, visual literacy programs have begun to focus on many different visual images or lessons found within the classroom framework that are more interactive. These programs have encouraged cooperation and communication. Many of the teachers too, are interacting with the students by guiding the lessons learned from the curriculum into a visual experience. The lessons are assessed through surveys of the visual presentation, question/answers, and classroom discussions. The students and the teacher maintain continuity by monitoring and clarifying the visual images within cooperative learning groups. Effective viewing skills are also taught. Some social lessons have been found to focus on commercial television viewing, including program analysis and advertisements that relate to communication activities of our society. Writing skills are also incorporated into the classroom lessons through script treatment, video poetry and program critiques.

FORMS OF COMMUNICATION

Visual literacy within the classroom has been used as a multimedia approach to the curriculum frameworks. It is a communication technique for students and teachers in networking old ideas into a fresh perspective. Through visual literacy, classroom programs have developed networks bridging communication, writing language and self esteem. "Visual literacy refers to a group of visual competencies a student can develop through sight and integration of sensory experiences." It implies that the student must be able to interpret the visual experience and once interpreted, he must be able to "talk" about it in order for it to become meaningful.

First, some background is in order. The major forms of communication are listening, the written message, and the visual message. Although these methods differ in the specific styles, they have several factors in common that contribute to a shared definition of communications:

> *They are all used in the classroom and channel information presented, received, and learned.*
>
> *They link individuals or groups in multiple locations within the classroom and outside the classroom setting.*
>
> *They are interactive, providing multiple communication bridges between individuals and groups.*
>
> *They are dynamic, involving the active participation of users.*

Video programs used in the classroom represent a form of communication which includes the listening speaking and writing styles. Listening involves voice or sound only communication. It is a language input skill. That is, information heard is going into a person's mind and is being processed as useful or not needed. It includes hearing or looking at the speaker, responses from the speaker when necessary, and asking questions if the information is not clearly understood. Listening systems include the telephone, conference calling, classroom presentations, television and lectures etc.

Graphics refer to programs that use written messages or graphics to convey or transmit visual information. It too, can be a support system to voice communications. Written language can be employed as notes, tablets, chalkboards, computer terminals, tests, documents, even video pictures. It is an "end-user device" or confirmation of the audio message.

Visual messages combine the listening or audio skill and visual/ video mediums to provide both voice communications and full movement or still visual images. It involves what we see and how we respond to what we see. Using this combination in the classroom of visual and audio media, the students can create a contemporary presence or mood that resembles face to face encounters with the ideas in the text books, lessons or frameworks. Expressions, attitudes and motivation change as the students become more knowledgeable in their interpretations of the lessons to be learned.

GETTING INTO THE VISUAL/VIDEO LITERACY GAME

Adopting a visual literacy framework provides the teacher with a number of different options, a wide variety of applications, and an even greater range of benefits to the "end- user" called "Student." Therefore: "What's a teacher to do"?

Three years ago, in 75 percent of the classrooms surveyed, an audio/listening-only system - the least creative - was being used. This system is also known as "lecture-style" presenting or turning on a video tape and just "watching it" without any kind of interaction. Tied at second were listening plus written language; students taking notes while the presentation is taking place. A one way visual input system was added. (video supplements to the lecture.) This is also one way visual input/motion because there is no interaction taking place within the groups or with the speaker.

The remaining classroom groups used a two-motion video system with input and discussions taking place on the part of the groups, and between individual students and the teacher acting as speaker. With the teacher monitoring group interaction, on task time continued even after the visual medium was turned off. Listening became important because of the interaction taking place between the groups and because the groups were held accountable for the information they interpreted from the visual presentation.

That was then, this is now; those teachers with some type of track record in using the visual media as an interactive tool, eventually got more adventurous and more willing to risk creative involvement with their students. The trend for many teachers today is to diversify their presentation styles and lessons into more than one type of input system. The students in concert with the teacher began to create their own visual supplements to the curriculum frameworks. They became a part of the decision making process as it related to the classroom goals and their outcome. The choice of success or failure became the students.

Even though many teachers are still using single presentation styles only, a large percentage have added the written component to their visual presentations. Many others have included multiple networks in their full presentation styles. Using multiple networks interchangeably with the students is also known as "interactive visual communication" which is becoming the fastest growing segment in education and industry today. This system allows the students to creatively add and interpret their own ideas and components to the learning process with the teacher acting as the facilitator of the curriculum information.

CREATING INTERACTIVE VISUAL COMMUNICATIONS

All in all, there is little doubt that visual literacy and communication is currently growing within the classroom and educational community. Teachers who are currently using an interactive method of delivery report a higher success rate in terms of self esteem, motivation and curriculum retention than those who only use a one-way communication delivery system. Largely, when interactive visual literacy came into the classroom it was a hit-or-miss affair. But still only a small percentage reported a lack of success.

Several factors come into play when accounting for the success rate. The greatest share of teacher users cite acceptance as the main reason, followed by total classroom management and involvement, increased creative patterns of use, flexibility in being able to meet the students needs and the ability to save classroom teacher/student time.

INNOVATIONS

Educational settings that incorporate communication components into their curriculum tend to be involved in other creative network innovations as well. Many use computer programs to aid in written language, script writing, and creative informational exchanges. Others use "cooperative learning" as the framework for discussion and presentation. Still others supplement the curriculum information with laser disk video, video poetry that the students "cooperatively" create, and teleconferencing using community resources made available to the educational settings. It seems that one these programs get up to speed with a classroom environment, other one-way system users will give rise to their own visual technologies and its uses within their classroom settings.

Comparing information from three years ago to present, we have discovered that our students are more visually directed and more technologically aware. They still need creative programs to encourage their own directed learning. Increases in visual literacy programs have nearly doubled over the last three years. This is a clear demonstration of the educational setting's acceptance.

The pace promises to accelerate over the next two years. Hopefully, the "hurdle effect" that operates in corporations and industry will filter across to the educational communities. Those programs that stick with "interactive visual communication programs" will experience a sharp increase in their success rates. They soon will begin to focus more of their attentions on the applications end, thereby growing with the students toward the end educational goal of successful, productive, communicatively aware individuals upon graduation from high school.

BIBLIOGRAPHY

Dutton, D. & Schallert-Lawrie, P. (1989) "Pragmatics Abilities Prediction Instrument" Co-op Publications. Garden Grove, Ca.

Hoskins, B. (1986) "Facilitating Conversation Interaction" Language/Speech Study Conference; LA County Office of Education, Lynwood, Ca.

Johnson, R. & Johnson, D. (1975) Learning Together and Alone Prentice-Hall, Inc., Englewood Cliffs, New Jersey

Lacy, L. (1987) Visual Education: An Interdisciplinary Approach For Students K-12 Using Visuals of All Kinds Minnesota Department of Education and Minnesota Public Schools

Prutting, C.A. & Kirchner, D.M. (1987) "A Clinical Appraisal of the Pragmatic Aspects of Language". Journal of Speech and Hearing Disorders 52 (2), 105-119

Schallert-Lawrie, P. (1988) Survey conducted at Alta Loma High School, Alta Loma, Ca.

Schallert-Lawrie. P. (1989) "Communication Skills Through Visual Literacy" Visions #1 School of Education, Cal Poly, Pomona, Ca.

Zakin, S.P., Communication Workshop Lingui-Systems, Moline, Illinois (1986)

TEACHING LITERACY THROUGH VISUAL METHODS: THE SYNTACTIC MODELING SYSTEM

Hyo Yeon
Annegret Reichmann

SMS - Syntactic Modeling System

The Syntactic Modeling System we have developed is a visual approach for teaching reading and writing. It is based on the following premises: Adults who cannot read or write can be extremely articulate in their use of spoken language. In the context, the relationship between a visual image and an articulated word is more easily established than between that same word and its written form. An illiterate adult must be given full recognition for his or her knowledge outside of reading and writing.

Our system aims to test the effectiveness of the image-idea relationship as an intermediate step in the learning process of reading and writing. Using syntax, symbols and (as the final level) written words, it provides a visual breakdown of a given sentence in 4 sequential steps. In the fifth and final phase, the system introduces actual terms for grammatical parts of speech. It is designed to be used by students and teachers on an individual basis during the latter stages of literacy instructions (equivalent to 5th grade level reading and writing).

To date, we have conducted extensive research in Linguistics, Iconology, Psychology, Design and Communication, from which an initial 3-dimensional "kit" has been created. With this, we are currently working in association with the Literacy Volunteers of Chicago to field test and to refine the end product for its use as a teaching aid. Upon reaching a functional solution, we will expand the system to incorporate an interactive computer-based product as well as a textbook.

SYNTACTIC MODELING SYSTEM - INSTRUCTIONS

This kit is based on a visual approach to teaching structured reading and writing. The premise is that a student who is unfamiliar with a written text can more easily describe a sentence or idea through pictures. Although a person may not be able to write or create a grammatically correct sentence, this person must be given full credit for his/her knowledge of the world. Not knowing how to write correctly does not preclude his/her ability to REPRESENT it. In addition, a single all-encompassing image (which is the starting point in our system) can be systematically broken down into correct "pieces" (or smaller pictures) which can be paralleled to syntactic or grammatical equivalents.

Our system is comprised of a base (with several tracks) and several display pieces. The process follows five consecutive steps, with each track displaying student/instructor work as follows:

TRACK 1:
The student is requested to represent a given sentence (or a sentence of their choice) with a single image (on 5" x 4" card).

TRACK 2:
The instructor works individually with the student to break down the initial image into 3 smaller images (on 2,5" x 2,5" cards). Each image should pictorially represent the **subject, verb** and **object** of the sentence (English is categorized linguistically as an "SVO" language, and all sentences can be broken down into these three parts).

TRACK 3:
The actual written form of each word of the sentences is introduced. The instructor can write each word with colored pens (provided). Subjects, verbs and objects are color coded (subject-red; verb-yellow; object-blue).

TRACK 4:
The three dimensional pieces (provided) are used to substitute each written word into a system of easily recognizable shapes. This enables the student to visualize them as grammatical "pieces" using color and shape, which are more easily retained in memory. Parts of speech which can be part of subject, verb OR object (e.g. articles, conjunctions, prepositions) are represented in grey. See attached sheet for breakdown of the pieces.

TRACK 5:
This final step serves to introduce the actual terms given to each "word" or "piece" of the sentence. A set of color coded pieces (which match the three dimensional pieces as well as the actual written words in color) with the appropriate part of speech prescribed on each has been provided for this purpose. Note that track 3 and 5 use translucent material so that the pieces can be overlayed on the images from 1 and 2 for continued recognition of the process as a whole.

Our system is geared towards a student who is already somewhat familiar with the process of reading and writing. It is designed to aid the student to understand correct grammatical English. Our major premise has been that although images may not effectively communicate a given idea to an outside party, the person who has created them can clearly associate these images with certain meanings which can be written. The active participation of the student allows better retention of what has been covered in class and encourages him/her to draw more freely from the knowledge base which already exists in his/her mind.

STRENGTHENING COMMUNICATION THROUGH THE USE OF DRAMATIC STRUCTURES

Barbara Roos

Narrative is a fundamental cultural process. Narrative forms dominate the mass media, even when content is ostensibly non-fiction. News has heroes and villains as do sports; many or most commercials are mini-dramas (Fiske, 1987). However, narrative structures seldom find a place in non-entertainment productions. When they are used, they are frequently ineffective. Given the pervasiveness and power of narrative form in all cultures, this seems strange. Surely when program content concerns interpersonal matters, and/or when production goals involve affective responses, narrative drama is an appropriate form, perhaps "the" appropriate form.

An overview of the role of narrative in non-entertainment productions begins with a summary of sources of narrative power. Secondly, characteristics of narrative structure are listed: it is suggested that failure to make accurate application of these elements in educational media productions is one cause of the reduced role of this major form of discourse in the classroom. Finally, several good examples of narrative forms used in informational/ persuasive productions are presented.

I. SOURCES OF NARRATIVE POWER

Among the sources of power for traditional (dominant, classical Hollywood/prime time) drama:

1. Screened stories present a homogeneous world. Even when narratives end unhappily, the ending ties up all the threads introduced during the drama. This in welcome contrast with the viewer's experience of the confusions and lack of closure in the real world (Andrew, 1976).

2. Production elements reenforce each other in order to maximize the aesthetic, logical and emotional effect of the production. Furthermore, no production element is allowed to distract/call attention to itself, again thereby insuring maximum dramatic impact.

3. The fact that viewers identify with characters and/or situations they see on screen is a major source of drama's power. Viewers vicariously experience pleasure, puzzlement, pain...

4. But they experience without risk. Viewers have the opportunity to try out experiences -- without responsibility.

5. Screened stories on occasion share in the powers of myth. The viewer participates in the deeply meaningful central conflicts of the culture.

II. NARRATIVE STRUCTURES

Narrative is the " .. recounting of a series of fictional events linked temporally and spatially, in cause-effect relationship" (Cook, 1985). However a practical definition must include more than this bare-bones definition if the production is to "read" effectively. Observation suggests that many or most non-entertainment programs attempting dramatization fail because they do not provide viewers with the genuine article. Rather than effectively utilizing key dramatic structures, they roughly approximate some of the less vital characteristics of visual storytelling. They try to achieve dramatic effect but fall short -- not because narrative was the wrong form to select but because it was done incorrectly. Here are some basic structures:

1. Conflict "...is the dramatic tension of film that involves a viewer and that ultimately draws his response and judgement" (Harrington, 1973). Conflict energizes the production. Conflict, in the traditional form of drama that still dominates the mass media today, has a resolution. Which is to say that stories have beginnings, middles, and endings.

Observation of non-entertainment programs suggests that many or most that attempt dramatization fall flat because they fail to have at their core a real conflict. Hence, they fail to genuinely engage viewers. And without real conflict, endings don't satisfy.

2. Characters. Only two are necessary, according to Haque (1988).

--The hero generates the story's action as s/he/they deals with an external (that is, visible) conflict. Narratives need heroes. It is not enough to have a main character: a main character with a conflict that viewers can recognize from their own experience is necessary.

Hague suggests that the second character must be selected from the following:

--The "reflection" shares the hero's externally visible conflict. S/he is there on the screen for the hero to tell things to (providing exposition about things not otherwise visible).
--The "nemesis" acts at cross purposes to the hero. However the hero's conflict may be with non-human forces rather than a character.
--A "romance" figure.

All major characters should be psychologically well-rounded.

In non-entertainment progamming often they are not. Instead, they are stereotypes and/or they lack the observable motivations coming from a plot that is based on conflict.

3. Screenwriter Syd Field (1982) suggests a third vital part of narrative structure. According to Field, each drama must have two major plot points. A plot point is defined as something that comes into the plot and turns it in a new direction. The two major plots points come about 1/3 and 2/3 of the way through the story. Thus, they reenforce the traditional tripartite structure of exposition, confrontation, and resolution. Plot points seldom appear in non-entertainment programming, thereby rendering the narrative predictable and uneventful.

4. An assortment of traditional formal production features define what narrative "should look like" in the minds of viewers. These elements evolved during the early years of the "talkies" and, despite modernist and post-modern tendencies in film and on television, they still operate. When this "grammar" is not used, drama does not reach its full potential. For example (and see Wollen, 1985):

- Angle/reverse angle over the shoulder shots of characters engaging in dialogue embed viewers in the scene.
- Point of view shots, a variation of angle/reverse angle. Seeing through the "eyes" of the camera/character sews him/her even more solidly into the scene.
- Narrative transitivity. The story is related in a tight logical sequence of events, with no extraneous material. While not a technique in the sense of the two mentioned above, the demands of narrative transitivity result in a myriad of specific editing decisions.

5. Oftentimes, the formal elements of a popular genre are adopted in order to further strengthen narrative.
Knowing "where the story is going" because of the familiarity of a specific genre frees viewers to experience fully the unique elements of the production.

Frequently, genres are adopted in a superficial fashion, in essence cheating the viewer by making them supply too many of the generic traits. So much has been written about the nature of specific genres that it is quite possible to develop accurate versions.

6. Observations suggest that production on film rather than videotape enhances viewer acceptance of narrative.

III. THE SUCCESSFUL USE OF NARRATIVE IN LEARNING SITUATIONS

Chairing a jury for the United States Industrial Film Festival offered the opportunity to view a selection of international productions over a three year period. International Television Association competition winning videos provided us with additional examples of top-notch non-entertainment programming.

1. OLD FRIENDS. Produced for the Washington State Bureau on the Aging and Adult Services by Puget Sound Power and Light Company under a Federal Agency on Aging Grant. The program's goal is to inform viewers about a "gatekeeper" strategy to help the elderly. Power company employees are trained to notice signs of trouble during their normal meter-reading rounds.

In this production, an elderly woman sinks into mental and physical confusion. The loss of her hearing aid is an effective plot point, leading her into a downward spiral of confusion and depression. She enters into movingly portrayed conflicts with the harried housewife who brings her groceries and with the boy who mows her lawn. Satisfying resolution of this genuinely effective dramatic situation is muted, however. A somewhat pat pep talk for the Gatekeeper program concludes the program on an undramatic note.

2. THROUGH THE EYES OF A CHILD. The Independent Order of Foresters/Florence Hallen Prevention of Child Abuse Fund/A Nick Hague Production. Hosted by actor Michael Caine, the program deals with child abuse.

A "point of view" technique is employed: viewers see and hear through the eyes of abused children. These forceful dramatic vignettes are given context by their placement within a reenactment of a group counseling session.

3. IT ONLY TAKES ONCE. Produced by the Corporate Media Center of Pacific NW Bell, with support from a number of industries. Aimed at teenagers, the program presents both facts and value judgements about teen pregnancy.

As is typical in much non-entertainment dramatization, this program handles the subject of teen pregnancy through a mixture of dramatization and documentary technique. Host for the program is a vivid "made up" character, Cabrini Green (who, as she points out repeatedly, is hip to the scene). She leads viewers through reenactments of teen romances as well as interviews with actual teen parents. Both members of a high school drama class and professional actors work convincingly and effectively in this production.

4. LIFE JOURNEY: BOUNDARIES AND BEYOND. Produced by Grand Valley State University in cooperation with WGVC-TV. Author Chaim Potok reads selections from his novel, "My Name Is Asher Lev".

The scenes are dramatized simply, using mostly non-professional actors. Effectiveness depends on the use of many close ups. The dialog is sparse, interrupting the author's voice-overs.

Clarkson (1989) generalizes what he sees to be the best opportunities for the use of drama in teaching or persuasion, mentioning especially:

-a real person relates his/her own story from his/her own point of view
-a docudrama, dramatized retelling of an actual event

Journeys, searches or mysteries (including questions/answers) as program forms flow easily from the content of many informational/persuasive productions and they also fit the traditional dramatic profile of exposition, confrontation, and resolution. Journeys, searches and mysteries as program approaches offer ample opportunities to generate plot points, and they have intrinsic conflicts which need only be highlighted by the script writer.

REFERENCES

Andrew, Dudley. (1976) THE MAJOR FILM THEORIES. Oxford University Press.

Clarkson, John. (1989) "Stuck on a Script? Tell Me a Story," CORPORATE TELEVISION. March/April, 1989. Pages 32-33.

Cook, Pam. (1985) THE CINEMA BOOK. Pantheon Books.

Field, Syd. (1982) SCREENPLAY: THE FOUNDATIONS OF SCREENWRITING. Dell Publishers

Fiske, John. (1987) TELEVISION CULTURE. Methuen.

Hauge, Michael. (1988). "Screenwriting A to Z," Seminar, Wayne State University, March, 1988.

Harrington, John. (1973). THE RHETORIC OF FILM. Holt, Rinehart and Winston, Inc.

Wollen, Peter. (1985) "Godard and Counter Cinema: 'Vent d'est'." MOVIES AND METHODS, volume II. Bill Nichols, editor. University of California Press.

DISCOVERING CREATIVITY

Dorothy H. Kennett

Opening Statement

The information and questions brought forth in this paper represent work in progress. It further represents a life, full of personal questions about what being creative means and what one is supposed to do about it. As an elementary and now college educator, I am also addressing the dual problem of what to do with students who "don't have a creative bone in their bodies," and what to do with those whose bodies are uncontrollably creative. It is about the demands put on someone perceived as creative to continually come up with original ideas. Finally, it suggests ideas and exercises (some original and some not) that can increase or improve one's visual awareness and in doing so his/her ability to look and act upon things in a more creative manner.

Readings and Comments on Creativity

Before we can even begin a discussion on creativity it is important that the researcher/writer and the reader have an agreement between them that it is a desirable characteristic to be creative; that being even a little bit creative can aid in the learning process, and that one's creative ability can be improved or increased. In reaching this agreement it will be helpful to answer the following questions to yourself:

1. Has anyone ever told you that you are creative?
2. Do you, yourself, believe that you have at least some creative abilities?
3. Does being creative apply only to the fine or performing arts?
4. Does being creative apply only to younger children?
5. Is it possible to increase your creative abilities?
6. Is creativity an inherited trait?
7. Or is it a result of environment and nurturing?
8. Is being creative tied in some way to intelligence?
9. Can you be intelligent and creative both?
10. Have you ever look up at the clouds and seen pictures?

The actual process of creativity involves the brain and brain functions, of course. Scientific investigation tells us that the human nervous system is connected to the brain in a crossed-over fashion. That is, the left side of the brain controls the right side of our bodies, and the right side of the brain controls the left side. It has also been discovered that in most people the left brain is responsible for language and language-related capabilities. Both hemispheres handle information in different ways and both are involved in higher cognitive functions. Each side specializes in different modes of thinking. For instance, the Left Brain, which is usually the dominant half, is considered to exhibit characteristics and learning/communicating patterns that are verbal and analytical. Additional words used to describe left brain functions are "structured," "abstract thinking," "counting," "step-by-step procedures," "rationality," "logical," "sequential (digital)," and "linear." On the other hand, the Right Brain exhibits characteristics described as "nonverbal and global." Words used to describe right-brain functions are "rapid," "complex," "whole-pattern," "spatial," "perceptual," "dreamy," and "intuitive."

Ideally, the two brains can work together. When thinking and responding require structure, analysis and logic, the left brain functions appropriately. On the other hand, when the response is more problem solving in nature and requires looking at the whole pattern or a variety of patterns and the "seeing" of things that exist only in the mind's eye, then the right brain should automatically function. However, it is possible for there to be a conflict.Too much emphasis usually developed from habit or convenience can cause one to rely on one side over the other until the ability to switch is virtually lost. Importantly, while many are capable of higher-level responding with both the right and left brains, and are capable of automatic responses, it is also possible for there to be conscious switching from the left to the right. This is something that we can train or re-train ourselves to do.

Activities to help you switch from the left side of the brain to the right are found in a number of sources although they don't always specify that that is their intent. One that is almost always mentioned and used in many different situations to get people to "think," is called "Brain Storming." Ask the members of your group to close their eyes and "visualize" the following things, or make up some of your own starting with something familiar and simple.

1. Visualize your front door.
2. Put your cat on the roof.
3. Picture the room you are in upside down.
4. Visualize receiving an Olympic gold medal for downhill skiing.
5. Visualize a leaf (in detail) from a plant in your home.

Another visualization activity involves displaying a common object. One that everyone could readily identify, such as a drinking straw, a red rubber ball, a block of wood, a clay brick. Then in a relatively short period of time (two or three minutes) ask them to write down as many uses for this item as they can. Some of the conclusions that have been drawn from this kind of visual responding is that the more responses that an individual makes, the more creative the person probably is. However, if all of the responses are considered common, then the less creative the person may be.

Models of Creative Thinking and Problem Solving

Of course, many people have studied creativity, and wondered about where original ideas come from. Briefly, the following outline is a synopsis or combination of what some of these scientific thinkers have developed as models of creative thinking.

1. An idea or problem comes to mind.
   It seems to be important–an application–something that needs to be accomplished.
2. A relatively intense study must then begin. All aspects of the problem, either overt or in the mind's eye, must be undertaken.
3. Many possible solutions then come to mind. Sometimes it is a good idea to write them down or make a chart. Often it all happens quickly with an obvious solution.
4. There it is! The solution. The Ah-Ha. The Eureka!

Enhancing Creative Thinking

Is it possible to train people to be more creative in their thinking? We believe that it is. What are some of the methods that can be used to enhance creative thinking? There are a number of exercises that can be of assistance. In the first one, three simple objects are shown to the audience. They can be real objects or line drawings. Suggested shapes are a square, a triangle, and a circle. Ask the audience to close their eyes and visualize each of the objects. Ask them to separate the three and get to know each one separately and well. Then, remove the objects from view and ask the audience to reproduce all three of them from memory. When this has been accomplished, ask them to draw a picture containing all three shapes and give that picture a name.

In the next exercise, the leader would produce a plain white tee shirt and the audience would be asked to design decoration for the shirt that would be appropriate for different wearers. For instance, what type of decor would be preferred by Nancy Reagan, a beach bum, a bag lady, a media specialist? Finally, introduce them to a "check-list"-type system in which they have a number of choices to make in the problem solving scenario.

Problem: A valued friend has brought us a huge bouquet of garden flowers. We don't have an appropriate vase or place to put them, the colors are terrible and several are past their prime. What are we going to do:

Here is our checklist:

1. Can they be put to another use?
2. Have we ever had something similar and what did we do then?
3. Can it be modified?
4. Can it be magnified?
5. Can it be minified?
6. Can we substitute something else?
7. Can it be rearranged?
8. Can it be reversed?
9. Can it be combined with something else?

Using the idea of problem solving it is also possible to approach creativity with another form of listing . We are actually going to analyze the situation. Start by stating the problem: *We have a big bunch of dead flowers that someone we value gave us*. List all of the attributes of the problem and beneath each attribute place as many alternatives as you can. When this has been completed look at the alternates; choosing different combinations, put them together into an entirely new form of the original problem.

Flowers

Dead Ones	Good Ones	Tall Ones	Short Ones	Solutions
Dried arrangement Press for bookmark Throw away Feed to birds Put on wreath	Put in best vase Buy a new chair or new wallpaper to match Share with a friend	Cut stems Put in large basket Hang up–upside down	Put in smal vase Give to a short friend	

In another approach, state the problem, pick up a book and ask someone to randomly select a word. See whether as a group you can find a possible solution using that word.

Example: I opened a book and randomly selected the word, "deserved." Using that "clue" I will deduce that the birds and other small yard animals deserve a wonderful place to hide and find nourishment now that it is cold. That will be the solution to my problem.

Things That Deter Creativity

Sometimes it is not our own fault that we exhibit uncreative choices when faced with the opportunity for problem solving. It may be something in the environment which deters or predetermines what our answers will be. The following are considered to be deterrents to creativity.

Such things as a poorly designed, overly rigid, and structured physical environment can be a deterrent. Likewise, an overly rigid and structured emotional atmosphere can deter us from creative thinking. Also such things as a lack of imaginative materials, lack of reward and stimulation can also deter. The lack of true application can also be a problem. It is extremely important that we feel that we have important tasks to perform in order for us to come up with creative ways to perform them. Low self-esteem is as much a deterrent to creativity as it is to any field. And finally, there are, unfortunately, some job places, some classrooms, where there is actually a bias against creativity.

Most deterrents can be identified and reversed to allow at least some creativity to flourish.

Where Is This Headed?

So far, this study has involved some reading of past studies, some investigation of historical research. It has also involved trying out some of the theories with college classes and colleagues. The next planned step involves the development of two charts which will evolve from further association with college-age students, hopefully some younger students, and some senior citizen (elderhostel) students. The first chart will compare these students' opinions as to the correlation between creative behavior and task performance displaying originality, realism, and skill. The second chart will compare creative performance and academic ability.

And, yes, it is a desirable characteristic to be creative.

Bibliography

Adams, James L.: *The Care and Feeding of Ideas: A Guide To Encouraging Creativity. Reading,* Massachusetts: Addison-Wesley, 1986.

Arieti, Silvano: Creativity: *The Magic Synthesis.* New York: Basic Books, 1976.

Curtis, Deborah; *Introduction to Visual Literacy: A Guide to the Visual Arts and Communication.* Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1987.

Edwards, Betty; *Drawing on the Artist Within.*New York: Simon and Schuster, 1986.

Edwards, Betty; *Drawing on the Right Side of the Brain.* Los Angeles: J.P.Tarcher, Inc., 1979.

Holt, John; *How Children Fai*l. New York: Pitman Publishing, 1964.

Khatena, Joe; *Imagery and Creative Imagination.* Buffalo, New York: Bearly Limited, 1984.

Ray, Michael and Myers, Rochelle; *Creativity in Business.* Garden City, New Jersey: Garde, 1986.

Rothenberg, Albert and Hausman, Carl., Ed., *The Creativity Question.* Durham, N.C.: Duke University Press, 1976.

Sebba, Gregor: *Creativity: Lectures by Gregor Sebba*; ed. by Helen Sebba and Hendrickus Boers. Atlanta, Ga.: Scholars Press, 1987.

Shepard, Rogers, Cathryn Downing, and Teresa Putnam., "Inner Vision," *Psychology Today,* 1985.

Stein, Morris I.; *Stimulating Creativity,* New York: Academic Press, 1975.

EXPERIENCING
VISUAL LITERACY

THREE DIMENSIONAL VIDEO: PERCEPTUAL AND AESTHETIC DRAWBACKS

Nikos Metallinos

Introduction

> "The future is not all tech. Respect of the physiology of perception and the essential requirements of human communication is an absolute necessity before any 3-D medium prematurely eclipses the TV set" (Hlynky, 1987, p. 16).

The rapid development of computer generated television technology during the last ten years has alarmed scholars of the television medium. It has generated serious discussions on the issue and brought new speculations and empirical observations into focus (Hlynky, 1987; Zettl, 1986).

These discussions, speculations and empirical observations were centered on the potential covert effects which computer generated television images will have when the fundamental rules of visual perception and aesthetic appreciation of televised images are violated, ignored or by-passed (Metallinos, 1988).

Researchers, developers, theorists and technicians of the visual communication media of film, television and holography are equally concerned about the commercialization and massive application of three dimensional media technology, particularly in television, which is developing rapidly (Green, 1983; Rosenberger, 1982; Fouts & Johnston, 1982; Hlynsky, 1987; Starks, 1982; Symmes, 1982; Hunter, 1987). These researchers and developers fear the hidden and hence unpredictable physiological and psychological consequences of 3-D television, the least of which are discontent, fatigue, bad taste and boredom.

Experimentation and small scale application of 3-D imagery, film, holography and television during the last thirty years undoubtedly have produced a novelty which seems to attract since it offers a new dimension, a vivid presence of the fictional world of film and television. In view of this advantage, however, researchers in 3-D media have raised several questions. For example, how will the technical and communicative obstacles of 3-D media effect viewers? Does the novelty of 3-D video demand viewer sacrifices of the freedom of motion and viewing conditions? If 3-D video causes viewer discomfort, fatigue, or boredom, why bother? What particular drawbacks, both perceptual and aesthetic, are generated by 3-D television images which should be made known and prevented? Shouldn't we encourage, and indeed embark on, long term, scientific research projects and experimentation on the potential hidden effects of the 3-D television images before we allow its expansion into an unprecedented massive application?

Basically, this study speculates on the foreseeable changes in viewers' perceptual and aesthetic habits which will be generated by the broader application and vast commercialization of 3-D television programs. It is argued that the physical restrictions imposed by 3-D television will require a considerable readjustment of viewing habits. Furthermore, it is argued that the ways by which a viewer involves himself emotionally or psychologically with 3-D television images requires a new set of rules, a "3-D vocabulary and grammar" (Green, 1982, p. 25) which must be learned quickly. The massive application of 3-D film glasses in the early fifties and sixties proved catastrophic. The perceptual and aesthetic restrictions imposed on the viewers were so severe that 3-D films were discontinued, and since then, only small scale 3-D media experiments involving a few viewers have been done.

Considerable improvements in the technology of 3-D media (particularly in film, television and holography) have been made. Well known researchers in respected institutions such as M.I.T. are now working to improve the technology and ease the obstacles posed by 3-D media (Brand, 1987). However, broader application and commercialization of 3-D media is being held back so far because of the inherent perceptual and aesthetic drawbacks

In order to focus on the issues posed by the forthcoming massive applications of 3-D television, and to answer some of the questions raised earlier, the following topics will be discussed:

1. A brief review of the evolution of 3-D media technology which point out the advantages and weaknesses of the various systems.
2. An analysis of the key principles of visual perception and aesthetics as they relate to 3-D media, in general, and television in particular.
3. The required changes in viewers' perceptual conditions and aesthetic habits in view of 3-D television technology.

From 2-D to 3-D Media

The necessity to extend man's experience with the three dimensional world to photographic images of those experiences was evidenced in the evolution of painting. To the masters of painting, the creation of the illusion of depth in the two-dimensional surface of their canvases was of major concern. The same concern was carried on by artists and scientists who created photography, striving to enhance the depth cues of the photograph. With the advent of motion pictures, this necessity increased even more, demanding better, more realistic images. Finally television, with its intimacy and spontaneity, stimulated scientists and television artists to create depth systems, or technology that displayed spatial differentials (Symmes, 1975, p. 441). Such depth systems which were intended to add the third dimension to two dimensional pictures are grouped under seven basic categories: (l) stereoscopic, (2) anaglyphic (3) polarized, (4) rastering, (5) alternative viewing, (6) volumetric imaging, and (7) holography. A brief explanation of each of these systems and their major drawbacks is necessary.

Stereoscopic Methods

Man's binocular vision, called stereopsis, which allows him to see the phenomena in the world three dimensionally, has triggered physicists and artists to attempt to duplicate this phenomena artificially, thus creating the stereoscope. As far back as 1833, the English physician, Sir Charles Wheastone created the first stereoscope which allowed each eye to see a different picture after an appropriate placement of three mirrors at the right angles. The stereoscope, in turn, created the pseutoscope which used prisms to exchange the eyes' visual fields, resulting in the concave look of objects (Gardner, 1983, pp. 64-63). According to Symmes (1974, p. 406), the stereoscopes were found in many houses throughout the 1800's and were perfected and widely used throughout the 1890's, although several experimental screenings conducted by William Friese-Greene found the stereoscopes to be totally impractical for commercial application.

Various types of stereoscopic equipment were developed later on, particularly with the advent of motion pictures, such as "the twin lense camera, or stereo-pair" developed by Harvard L. Hull of the National Laboratory of Chicago in the early fifties (Symmes, 1982, p. 1269); the "Hammond Organ Fame," a system in which the stereo-pair was projected in alternate frame style, left to right; the "stereovisor" system which was developed by James Butterfield, made with small mirrors and "held on the spectator's face with elastic bands" (Symmes, 1982, p. 1269), etc.

Although these systems aided in the development of 3-D media, they had serious drawbacks. They were primitive and impractical because "they required viewers to wear cumbersome apparatus on their heads or mounted in front of each seat" (Gardner, 1983, p. 66).

Anaglyphic Methods for 3-D Media

Based on the perceptual principles of stereopsis and complimentary colors, this method was developed by scientists as far back as 1891. According to Balasubramonian and Rajappan (1983, p. 101) "Ducos du Hanron was the first to suggest the anaglyph method of separating the stereo pair of images by printing them in complementary colors and viewing them through color filters. . ." Although Symmes (1974, p. 406) attributes the anaglyphic method to scientists Rollman and J. D. Almeidre, he, too, states that "the anaglyph (relief picture) system involves coloring the stereo pair red and blue (or green) and superimposing them. Decoding is achieved by glasses with red and blue lenses." Since each eye sees a different picture when the two images are projected in superimposition and viewed with glasses made with filters of corresponding colors, a three dimensional image is created (Symmes, 1974, p. 406; Frisby, 1979, p. 77).

Experiments with anaglyphic methods for 3-D media continued through the fifties and the sixties involving television as well and improving the glasses required by the system. Several 3-D movies and 3-D television programs were made, some of which were successful, while others were not. The drawbacks of the anaglyphic system were decisive, particularly in 3-D television applications. Summing up these various drawbacks, Balasubramonian and Rajappan (1983, p. 101) conclude that:

> 1. It is suited to monochrome 3-D TV only...
> 2. Good black and white quality cannot be achieved...
> 3. The spectral response of the eye for different colors is not uniform and therefore the intensities of images seen by each eye will be different...
> 4. Color filters with narrow band spectral response characteristics are not available in practice...
> 5. Continuous wearing of color filters is strenuous...

The same views are shared by Free (1988, p. 58), Symmes (1974, p. 406, 1982, p. 1271), and Gardner (1983, p. 67). Balasubramonian and Rajappan (1983, p. 101) conclude that "headaches and tiredness invariably affected everybody after using the color filters for a considerable length of time, although the depth perception was generally good. Therefore, the anaglyph separation technique is inappropriate for 3-D TV as a permanent solution."

Polarization Methods of 3-D Media

According to Balasubramonian and Rajappan (1983, p. 102) and Symmes (1974, p. 408), the principle of polarized light for the stereo projection of images can be attributed to English scientist J. Anderson in 1891. The Polaroid filters were developed, according to Gardner (1983, p. 67), by Edwin H. Land. Symmes (1974, p.408) states that:

> A polarizing filter is like a comb that combs light so that it travels in one direction. If the two combs are oriented in the same way they let light through. If they are oriented 90 degrees to each other they cross polarize and block light, thus becoming opaque.
>
> Polarizing filters, substituted for the colored ones used in the anaglyph method, produce the same 'selective' effect without coloring the image.

Throughout the fifties and the sixties, more than 50 polarized 3-D features, both films and TV productions, were made using special and improved 3-D glasses or special TV sets, cameras and/or transmitters (Symmes, 1982, p. 1211). The latest of these polarized methods are the "bicircularly polarized viewing system" which employs an electro-optic material for a 3-D color TV using only a single picture tube (Balasubramonian and Rajappan, 1983, p. 102) and the "electro-optic polarizer based 3-D viewing system" which uses an electro-optic plane polarization twister which "generates the linear orthogonal plane polarized lights needed for the bicircular polarization" (Balasubramonian & Rajappan, 1983, p. 102). This system is the latest extension of the bicircular polarized viewing system and is quite compatible with conventional 2-D color TV equipment.

As with previous polarization methods, researchers are not particularly optimistic about broad consumer application of these two newest systems due to their significant drawbacks. For example, Balasubramonian and Rajappan (1982, p. 102) point out that the bicircularly polarized viewing system ". . .due to crosstalk problems poses a constraint on the viewer that he has to keep his head erect while seeing the picture tube." And, with the electro-optic polarizer based 3-D system ". . .there is little cross talk in the fringe area of vision. If anyone looks at the screen with naked eyes, he will be able to see a strongly defused 2-D image due to averaging of left and right eye view images." (Balasubramonian and Rajappan, 1982, p. 102).

Raster Method of 3-D Media

The raster method of 3-D imaging assumes several names; "lenticular 3-D" (Symmes, 1974, p. 408), "single and double sided lenticular 3-D" (Free, 1988, p. 61), "autostereoscopic 3-D system" (Balasubramonian and Rajappan, 1983, p. 104). The principle under which this system operates is both an old and a simple one. It dates back to the 1800's and is based on genuine stereopsis. Although this system has been greatly improved since the 1800"s, the basic technique, according to Gardner (1983, p. 67), is:

> ". . .to slice two or more pictures into hair-line thin vertical strips [called lenticular sheets or screens], interlace them side-by-side, and cover them with a plastic coating of vertical ridges that act as cylindrical lenses. If the head is held straight, the left eye sees only the strips forming the picture for the left eye and the same is true for the right eye."

The raster method has been applied to various still panoramographs such as post cards, magazine covers and inserts. However, its application to motion pictures has proven to have serious drawbacks such as cost of mass production of lenticular screens and restrictions on spectator viewing zones (Symmes, 1974, p. 408). Undoubtedly, the most improved rastor 3-D method is the autostereoscopic 3-D system which was applied to television. According to Balasubramonian and Rajappan (1983, 104):

> Autostereoscopic television is one form of stereoscopic technique wherein the stereo image pair separation is performed in the display screen itself by using special types of screens known as direction selective screens such as lenticular lens sheets and the lens does not call for any viewing aid.

Experiments with this system thus far have not produced the desirable results since ". . .all these autostereoscopic systems using lenticular sheets are not compatible with the conventional 2-D TV equipment and standards due to increased band width requirements and optical complexity." (Balasubramonian and Rajappan, 1983, p. 104).

Alternative View 3-D Methods

The alternative view method of creating 3-D images is also old and relatively simple in its mode of operation. According to Symmes (1974, p. 408):

> The right and left views are stacked one upon the other. When projected they appear to be forming one, blurry image. When the composite image is viewed through an appropriate viewing aid, one eye is allowed to see every other frame and vice versa.

At the beginning, the most commonly used viewing aid was a mechanical apparatus in which a shutter was connected to projectors which alternately covered and uncovered the spectator's eyes (Symmes, 1974, p. 408). Used primarily during the twenties and thirties, this system produced good 3-D effect, but practical considerations in projection and viewing reduced its efficiency drastically. The advent of television brought a new alternative viewing 3-D system called Fast Liquid Crystal Shutters, or LC. According to Free (1988, p. 60):

> Liquid-crystal shutters, worn as glasses, appear with many 3-D systems. Left and right views of scenes or objects are displayed sequentially-a split second apart-on a screen. Small electric currents, synchronized by a controller, flow through a wire connected to the LC shutters. When the view of the left eye appears on the screen the right shutter is triggered and darkened. When the right eye view appears, the left shutter becomes opaque. Rapid switching simulates normal binocular viewing, which creates a 3-D image in your mind.

Various electronic companies like Toshiba, computer companies like Atari, and video game companies like Sega, have projected the LC system in their efforts to eliminate some of its major drawbacks, namely flickering, picture tube brightness, contrast, and blurring.

Volumetric 3-D Imaging Method

This method is restricted to 3-D television imaging and is created by assembling the sectional images of a 3-D object and exposing them physically in a three dimensional display machine. In explaining how this method works, Balasubramonian and Rajappan (1983, p. 104) state that "a varifocal mirror operated by a loudspeaker registers different sectional images of the object sequentially and another varifocal mirror associated with the picture tube vibrates synchronously to produce a virtual volumetric display."

In the beginning, a major drawback of this 3-D imaging method was the image blur due to the unfocused region of the object depicted. Some techniques to remove the blur were tried, but with no great success. Balasubramonian and Rajappan (1983, p. 104) conclude that ". . . the varifocal mirror techniques invariably demand longer band width to obtain realistic display. Also phantom imaging effect is inherent in this system."

Holographic Method

This is the ultimate 3-D medium which has been around since the 1940's. The principle under which holography operates is described by Rosemerger (1982, p. 48) as follows:

> Holograms are made with lasers and photosensitive emulsions. Simply described, a laser is directed to a beamsplitter, dividing the beam of laser light into a reference beam and an object beam. The reference beam bounces off a mirror onto a photographic plate, and the object beam bounces off another mirror onto the object being 'photographed' before rejoining the reference beam on the photographic plate. As the two beams intersect on the plate they create an interference pattern that conveys 3-D information about the object in the hologram.

In order to be able to see a hologram, a reference beam of light must shine on the photographic plate. Today holograms are found in art galleries, holographic museums, and public displays. They have found application in popular magazines, post cards, credit cards, etc. Holographic films have been made in laboratories and have been shown on a small scale in public. But holographic television, the ultimate 3-D method, is yet to come.

At the Massachusetts Institute of Technology (M.I.T.), researchers are working to perfect the ultimate 3-D television system, holographic television based on auto stereoscopic television viewing and holographic imaging combined (Brand, 1987, pp. 83-91).

The transmission of holograms into real time in order to broadcast them on television is but one of the obstacles in the development of holographic television. As Alexander (1988, p. 35) points out, "currently the information contained in a single still hologram far exceeds the capability of any mass broadcast communication method. Vast reductions in the amount of information in a hologram, then, is a key goal to researchers in the field."

Researchers are optimistic that computer interface with holographic information, digital-to-hologram converters, and fiber optics (due to the enormous amount of information they are able to transmit) will offer tremendous assistance in eliminating the problem of the huge amount of bandwidth, or frequency space, required (Free, 1983, p. 110) for the successful broadcast of holographic television.

Reiterating on this major obstacle, Rosenberger (1982, pp. 36-49) is much less optimistic about the development of holographic television and its future massive application. He points out that the numerous inherent differences between the two media (holography and television) distance the development of holographic television beyond the year 2000. The fact that holography is a photographic medium, not an electronic one, as is radio, that it is made with lasers and photosensitive emulsion, that broadcasting would require such an enormous amount of television bandwidth, and that holograms cannot be produced outdoors since they require coherent light are all serious obstacles in the way of the development of holographic television.

As this brief review of the development of the various 3-D media methods indicates, there are certain inherent mechanical or technical drawbacks which influence the perceptual and aesthetic principles that govern the visual communication media. It is this factor that must be examined next.

Perception and Aesthetics of 3-D Media

From the seemingly unrelated fields of perceptual psychology and telecommunications, a number of guidelines in viewer perception and television composition have been developed. Through extensive study, research and experimentation in both fields, new concepts, principles and theories have emerged which fall under the new field of study called media aesthetics, or visual communication media aesthetics. In this field, the physiological conditions under which viewers perceive and recognize pictures, and the psychological processes involved in viewers' comprehension and appreciation of pictures are examined. From the works of such scholars in the field as Arnheim (1969), Gibson (1979), Berlyne (1974), Kennedy (1974), Dondis (1973), Zettl (1973), Baggaley, et al. (1980), D'Agustino (1985), etc., we know the physiology and the psychology of picture perception and appreciation. Both perception and appreciation of images composed in the visual field, the concentrated space of the film and television screen, differ significantly from objects or people in the real world. The distinctive ways in which the visual world and the visual field are perceived have been underlined by such perceptual psychologists as Gibson (1950), Gombrich (1960), Hochberg (1968), Goldstein (1980), etc. The visual world is borderless and three dimensional, the visual field is bounded and two dimensional. Objects and people in the visual world have depth, whereas their images in the visual field are depthless or two dimensional. A limited, framed or bounded visual field dictates that construction, composition or synthesis of images photographed in the visual world must be done using certain rules of composition which are pertinent only to the particular medium. In the case of television images, such primary rules of composition as main direction of visual elements within the television screen, proportions which divide the various areas and elements within the television screen, and balance of both the positive and negative spaces within the frame must adhered to (Arnheim, 1969; Zettl, 1973; Dondis, 1973; Metallinos, 1979).

Additionally, television images require a certain amount and certain types of lighting. They require properly distributed colors. They must be framed with special, well established rules of enhancing the illusion of depth, maintaining the figure-ground distinctions of the visual elements with the visual field. They are composed with restricted speed of motion, juxtaposition and clarity of visual elements within the television screen. When these perceptual and aesthetic guidelines are violated, ignored or abused, viewer attention might be captured momentarily-particularly when such violations are purposeful (Cerulo, 1978), but clear understanding and appreciation of the visual images are found to be significantly diminished (Metallinos, 1988).

The fundamental rule of depth of field, which allows our eyes to sharply focus on objects in the visual world by adjusting our binocular vision automatically, is a biological-physical property of our visual apparatus which cannot readily be duplicated by mechanical means such as cameras, lenses and computer generated images. While our eyes can easily bring into focus objects in the visual world, readjusting automatically from wide to narrow depth of fields, cameras - film or television - do not have that flexibility. The mechanical apparatus which force readjustments of the depth of field in order to produce 3-D images produce discomfort, viewing fatigue, headaches, etc. The process is, therefore, limited aesthetically and perceptually (Williams, 1974, pp. 420-425). It requires viewers to readjust to these new conditions.

Pioneering technicians of 3-D motion pictures and television have pointed out yet another serious perceptual drawback in the construction of 3-D images, the cardboarding effect. According to Williams (1974, p. 425), the physical property of our eyes called *interocular* (the separation of our eyes) which allows us to see the visual world three dimensionally must be duplicated by mechanical means in order to create the illusion of 3-D in 2-D images. Whereas our eyes are flexible and adjust automatically to perceive depth in distant objects and scenes, cameras attempting to duplicate this property have not always been successful. They are limited and thus sometimes create the cardboarding effect. When the interaxial, the stereo camera's right and left eye separation, is not flexible enough, as is the case with the majority of the 3-D media systems described earlier, the elements in the scene appear to be either flat, lacking roundness, or depthless, lacking distance separation. This crucial area of 3-D mechanics is yet another physical obstacle which has decisive perceptual and artistic drawbacks, and requires readjustment of natural viewing habits (Williams, 1974, pp. 420-425).

According to Gardner (1983, p. 63): "It is the binocular illusion called stereopsis that must be simulated if movies and television are ever to become truly three dimensional." Regardless of the years of experimenting to simulate this important human property, we are still far from complete success. Due to occular separation, each eye is presented with a slightly different view. The eyes receive information pertinent to the distance of the subject as the two lines of sight converge on the observed phenomenon (Waldern, et al, 1986, p. 653). Perceptual discrimination of this visual perception property does not go unnoticed by 3-D viewers. It is a novelty to which they must learn to adjust. As Gardner (1983, p. 65) explains:

> Seeing is a process by which the brain unconsciously forms hypotheses about the world, then rapidly selects the best bet in the light of one's experience . . . The mind's tendency to interpret flat pictures in light of experience is the basis of many depth illusions.

However advanced stereo film and television cameras become, they will never be able "to interpret pictures in light of experience." The 3-D camera will always rely on mechanical tricks to force the viewer to perceive depth. In short, the viewer is told what to perceive, which is an important drawback.

Perceptual psychologists and optical engineers who have studied the perceptual factors in 3-D images have pointed out two additional important factors to be considered, namely motion paralax and motion perspective In the mechanical construction of 3-D images, the depth cue factor known as motion paralax presents a serious obstacle. According to Walder, et al (1986, pp. 650-651):

> When a person viewing a scene moves his or her head, objects which are near appear to move more rapidly than those more distant. Similarly, if two objects (which are at different distances from the viewer) are moving at the same speed, the object closer to the viewer will appear to move faster than the ones further away.

It was shown that duplication of this phenomenon with mechanical means on the 2-D surface of the film or TV screens cannot be done faithfully, regardless of the attempts made. Neither the speed at which near objects move nor the distance of the objects from each other and from the viewer can be maintained consistently by any 3-D media system existing today.

An equally, serious obstacle in the perception of 3-D images is the depth cue factor known as motion perspective defined by Waldern, et al (1986, p. 651) as " . . . the continuous manner in which the view changes providing information about the scene, when the viewer and scene move steadily with respect to one another." In many 3-D media systems, the viewer and the scene cannot easily "move steadily with respect to one another" since they are produced by mechanical means. Unwanted and unwarranted instability of camera movements often disturb the normal motion perspective which, in turn, limits the information about the scene. Such drawbacks cannot be discounted.

Apart from the above perceptual, physical or biological factors, 3-D media systems in existence today present a number of emotional, psychological or aesthetic obstacles. At the top of this list are the various hardware restrictions imposed on viewers such as viewing glasses, specially designed viewing seats, polarizers or specially designed 3-D viewing areas. Efforts to eliminate such hardware restrictions are being made, but they are unperfected and as yet on an extremely limited scale (Free, 1988).

The present requirement to wear specially designed 3-D viewing glasses, either with green and red filters or the electro-optic ones, restrict both the viewer's field of vision and head and body movements. Emotionally speaking, this creates stress, uneasiness, fatigue, and inevitably, boredom (Free, 1988, pp. 58-62; Starks, 1982, pp. 987-993). With such emotionally distressful viewing conditions, how will it be at all possible for anyone to fully appreciate the 3-D images? The specially designed viewing seats, in some cases, have also proven to be emotionally disturbing, primarily because the viewer's head must remain motionless and in perfect vertical position throughout the viewing process. As soon as the head moves, the vertical and horizontal parallax are disturbed, resulting in emotional disturbance as well. This, in turn, destroys any attempt to relax, to understand and to appreciate the 3-D images on display. The same is true with the use of polarizers or the specially designed 3-D viewing areas where, again, the spectator's field of view and their free flow of movements are decisively restricted. The viewer's organic readjustment to these conditions is necessary. But is it possible to become easily conditioned to this new viewing situation?

Additional 3-D hardware generated factors such as image noise, blurring, flickering, unfaithful (unnatural) colors, etc., are known to influence 3-D media viewers' aesthetic appreciation of 3-D images. They have been known to cause such emotional and psychological distress as headaches, visual fatigue, dizziness, and upset stomach, and, of course, this hinders the ability to fully appreciate the 3-D images (Symmes, 1982, pp. 1269-1271).

When a massive application of 3-D television does materialize, a significant aesthetic factor in television composition known as figure-ground consistency of visual elements within the visual field will be decisively violated. The viewer's habit of perceiving certain visuals as grounds and others as figures will be decisively challenged (Bloomer, 1976, pp. 35-38; Metallinos, 1988). Looking at holographic television images, for example, the viewer at first will be confused as to what elements constitute the figures and which constitute the grounds since they will be perceived as though they are phantoms, ghosts, floating in space, completely transparent and coming from nowhere (Rosenberger, 1982, p. 49). The viewer will be receiving much more information, much more visual imput, than they need or are accustomed to. This will create an overwhelming feeling of imbalance in the aesthetic appreciation of 3-D television images. In speculating on this issue, Prof. Stephan a Benton, head of the Spatial Imaging Department of M.I.T.'s Media Lab., states:

> If you consider what passes for acceptable video, our visual system seems to be very 'low-fi'--it makes massive assumptions about the way the world is tied together. In fact, we're giving it much more data than it wants or can use. My instinct is that there's paydirt in that direction (Brand, 1987, p. 89).

Certainly there are limits to both the viewer's tolerance for the perceptual violation of the harmonious figure-ground relationship and the viewer's ability to comprehend and appreciate over-loaded, complex and often unnecessary visual data.

Just as the novelty of stereo television sound was initially received by the average viewer with cynicism and skepticism (particularly due to the perceptual and aesthetic imbalances between the low definition television picture and the high quality of stereo sound), so will the novelty introduced by stereo 3-D television be received (Skalnick, 1976, pp. 49-52; Schwartz, 1979, pp. 4-7). Until the viewer has the chance to understand its value, learn to appreciate its depth, and readjust himself to this new medium, any massive application or commercialization of 3-D television is bound to have undesirable results.

Time, space, and motion are among the most important aesthetic agents in the synthesis of film and television images. The role of time and timing, of space and framing, and motion and editing as aesthetic catalysts in the construction of moving images has been studied and published by such pioneers of the visual communication media of film and television as Moholy-Nagy (1969), Kepes (1964, 1966), Millerson (1972), Zettl (1973), etc. Years of study and experimentation with moving images has viewers themselves must be more responsible in their selection of 3-D media programming. As was pointed out earlier, 3-D television might be an overwhelming experience, a visual overload for those viewers who have been conditioned to commercial 2-D programming. Such functional programs as newscasts which provide straightforward information do not have to be viewed in 3-D images. When future 3-D media spectators learn to value visual and auditory input, selecting only those programs which they need or can handle, such spectators will slowly overcome the perceptual and aesthetic obstacles of 3-D medium technology

A third alternative is understanding of the new principles, the perceptual and aesthetic factors inherent in 3-D media technology. It is expected that a future potential 3-D media spectator will be better equipped to slowly adjust to any new 3-D medium if he/she has a fair understanding of the grammar of that medium. Such understanding, according to Green (1983, p. 25), will enhance the spectator's trust of the medium. The spectator who knows the vocabulary, the workings, the perceptual and psychological factors interwoven with the medium, will have less difficulty in adapting, and even control the medium rather than letting the medium control him.

In summary, the processes of adjusting to 3-D media suggested above are knowledge, control and understanding of the workings of 3-D media. This, however, is true for all new technology, be it medical, engineering or media. Developers, researchers, and teachers of any new technology, including media, have the responsibility to make potential users, spectators, aware of drawbacks and advantages of the technology. To alleviate and eliminate the discomfort caused by the perceptual and aesthetic drawbacks of 3-D media technology, we must all learn more about the media and be critical of their aesthetic merits, particularly their massive consumption by uninformed spectators.

Readjusting Processes for 3-D Viewers

Unquestionably, the world we live in is three dimensional, and the visual communication media we have created as extensions of ourselves must carry the perceptual and aesthetic properties of three and even more dimensions invariably interwoven into them. The future demands our readjustments to 3-D media (film and television, digital 3-D images, holographic television, etc.), and we must learn to slowly adapt to these somewhat physiologically and psychologically awkward impositions posed by present day 3-D technology.

Equally, however, we must learn to be cautious, skeptical and even judgmental, and not to unquestionably give in to 3-D media technology just because it's a novel idea as we did with 3-D films in the early fifties. We must be skeptical as to the potentially overwhelming effects the massive application of 3-D media programming will have on viewers. Our environment is complex and overwhelming enough, providing us with more data input than we can possibly need. The addition of 3-D media imagery on a grand scale will complicate and overload our visual information even more, and this might start turning viewers away rather than towards such media technology. We must be judgmental, critical and even analytical as to the actual communicative value of this new 3-D technology.

Contrary to the belief held by some neophytes of 3-D media technology (Gardiner, et al, 1989, p. 3), stating that we should let natural progression overtake the development of 3-D imagery, such important 3-D media researchers as Hlynsky (1987), Foutis & Johnston (1982), and Symmes (1974) are rather cautious, regarding the future application of 3-D media technology. These researchers, are aware that progression is not necessarily progress. Consequently, they recognize the power of rigorous and systematic research. The media are powerful. They touch everyone. They are capable of directly influencing the viewer. Hence, we must be alert to the potential problems caused by the rapid development of media technology.

What alternatives can we offer to the future consumer which will facilitate his easy, gradual and organic acceptance of 3-D media technology?

Knowledge of the advantages and disadvantages of the novelty of 3-D media technology is one alternative. As was pointed out earlier, there are advantages and disadvantages in each of the developed 3-D media systems. Industry and researchers, developers and consumers have an obligation to inform each other of such advantages and drawbacks long before the massive availability is implemented. The use of the media to inform the public about the media is an effective means of communication, reaching all segments and appealing to all levels of spectators. When potential spectators are made aware (perceptually) and are informed (systematically) of the technical, neurophysiological, perceptual, aesthetic and communicative drawbacks of the particular 3-D medium, they are given a chance to ease their way, to adjust slowly, and to adopt the 3-D media of their choice.

Another alternative is controlled exposure to the novelty of 3-D media technology. Because it is not a customary practice by the industry to instruct the media consumer as to what is good or bad for him or what is necessary or unimportant, the helped to establish the parameters in which time, motion and space operate in order to compose visual messages with an aesthetic merit. Three-dimensional images, particularly in film and television, have been shown to have affected these aesthetic agents.

Holographic researchers such as Hlynski (1987), Rosenberger (1982), and Alexander (1988) contend that the liberties 3-D image makers take with time and timing are catastrophic and annoying. It takes more time to view and comprehend 3-D images than 2-D images, and contemporary television viewers have learned to watch fast-paced commercials. Hlynski (1987, p. 16) is very skeptical on this issue, stating that:

> Contemporary film and video take great liberties with time and space. These need to be re-examined during the development on any future 3-D entertainment form. Fast-paced edits are easier to follow in two dimensions than in three. But even while holographic technology develops, TV advertisers are training the public to read more edits per minute than ever before.

Even more annoying and cumbersome is the abuse of the aesthetic principle of space and framing. Overuse and over-emphasis of Z-axis staging (the inward/outward motion of visual elements within the visual field), coupled with over-stretching the field of vision (over-exceeding its 180° horizontal and 150° vertical vistas), produces anti-aesthetic feelings. In commenting on this issue, Hlynski (1987, p. 15) states:

> First and foremost was the naive but persistent practice of impaling the audience on the Z-axis . . . Although this application is a natural choice, it ignores the more sublime qualities of stereoscopic visions . . . scintillation, reflectivity, transparency and complex space.

Closely related to framing is the motion of visual elements within the visual field which is an important and extremely sensitive aesthetic agent. Research has shown that the perceptual limits of motion are well established. Any stress, abuse or oversight of these limits will result in viewer misunderstanding or confusion about the visual message (Metallinos, 1987). This is also acknowledged by Hlynski (1987, p. 15) who discusses the design of moving space and warns that:

> When panning the camera in 3-D cinematography or when an element enters the frame from off screen, any projection forward of the screen makes the limits of the frame more apparent . . . Three dimensional lap disolves create spatial confusion if not done continuously. Even careless dolly shots can produce sensations of motion sickness. It simply takes more viewing time to explore Z-axis

In the future, three strong forces will be constantly at work, namely technology, commercialization, and easy access to 3-D television programming, leaving no other choices for 3-D television viewers other than to abstain from viewing such programs or to learn to readjust fast and to cope with this technology.

References

Alexander, K (1988). Holography may see role in television's future. BM/E: Broadcast Management/Engineering, 24, 37-38.

Arnheim, R (1969). Art and Visual Perception: A Psychology of the Creative Eye Berkeley: University of California Press.

Baggaley, J., Furguson, M. & Brooks, P. (1980). Psychology of the TV Image. New York: Praeger Publishers.

Balasubramonian, K. and Rajappan, K. P. (1983). Compatible 3-D television: the state of the art. In J. Ebbeni and A. Monfils (eds.) Proceedings of SPIE - the International Society of Optical Engineering, Vol. 3: Three-Dimensional Imaging, 100-106, Geneva, Switzerland.

Berlyne, D. E. (1974). Studies in the New Experimental Aesthetics: Steps Towards an Objective Psychology of Aesthetic Appreciation. New York: John Wiley & Sons.

Bloomer, C. M. (1976). Principles of Visual Perception. NY: Van Nostrand-Reinhold.

Brand, S (1987). The Media Lab: Inventing the Future at M.I.T. New York: Viking Penguin, Inc.

Ceruio, K. A. (1978). What is wrong with this picture? Communication Research, 15, 93-101.

D'Agostino, P (1985) (ed.). Transmission. New York: Tanam Press.

Dondis, D. A. (1973). A Primer of Visual Literacy. Cambridge, MA: The M.I.T. Press.

Fouts, G. & Johnston, C. J(1982). Effect of 3-D television on spontaneous recall and learning. Canadian Journal of Communication, 8, 1-14.

Free, J. (1988). 3-D TV. Popular Science, 232, 58-63 & 110.

Frisby, J. (1979). Seeing: Illusion, Brain and Mind. NY: Oxford University Press.

Gardiner, S. Thwaites, H., and Davet, C. (1989). Mobile movie theatre on your mind: Review of coming attractions. An article submitted to Cinema Canada on February 1, 1989, Concordia University, Department of Communication Studies.

Gardner, M. (1983). Illusions of the third dimension: practitioners of trompe L'oeil have gone high tech. Psychology Today, 17, 62-67.

Gibson, J. J. (1950). The Perception of the Visual World. Boston: Houghton Mifflin, Co.

Gibson, J. J. (1979). The Ecological Approach to Visual Perception. Boston: Houghton Mifflin Co.

Goldstein, E. B. (1980). Sensation and Perception. Belmont, CA: Wadsworth Publishing Co.

Gombrich, E. H. (1960). Art and Illusion: A Study in The Psychology of Pictorial Representation. Princeton, NJ: Princeton University Press.

Green, K. (1983). 3-D video: another step. Video Systems, 9, 24-29.

Hlynsky, D. (1987). Designing holographic TV. Holographer, 15, 14-16.

Hochberg, J. E. (1968). Perception. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Hunter, D. M. (1987). 3-D television has become feasible. Mediascene, 9, 20

Kennedy, J. M. (1974). A Psychology of Picture Perception. San Francisco: Jossey-Bass Publishers.

Kepes, G. (1966) (ed.). Sign, Image, Symbol. NY: George Braziller, Inc.

Kepes, G. (1969). Language of Vision. Chicago: Paul Theobald & Co.

Metallinos, N. (1979). Composition of the TV picture: some hypotheses to test the forces operating within the TV screen. Educational Communication and Technology Journal, 27, 205-214,

Metallinos, N. (1987). Comprehension and recall of television's computerized images: An exploratory study. In M. R. Simonson & S. M. Zvacek (eds.) Proceedings of Selected Research Paper Presentations at the 1987 Annual Convention of the Association for Educational Communication and Technology, 481-512. Iowa State University.

Metallinos, N. (1988). Computerized television: technology overshadows aesthetics. Canadian Journal of Educational Technology, 17, 37-52.

Metallinos, N. (1988) Figure-ground anomalies in commercial television. A paper presented to the Canadian Communication Association Annual Conference, Windsor, Ontario, June 8, 1988.

Millerson, G. (1972). The Technique of Television Production. NY: Hastings House Publishers.

Moholy-Nagy, L. (1969). Vision in Motion. Chicago: Paul Theobald & Co.

Rosenberger, G. (1982). 3-D TV. Video Systems, 8, 36-49.

Schwartz, T. (1979). Listen. TV Guide, 27, 4-7.

Skalnick, R. (1976). The ears have it. Educational Broadcasting, 9, 49-52.

Starks, M. (1982). The rebirth of 3-D. American Cinematographer, 63, 987-993.

Symmes, D. L. (1974). 3-D cinema's slowest revolution. American Cinematographer, 55, 406-409.

Symmes, D. L. (1982). 3-D television. American Cinematographer, 63, 1269-1272.

Waldern, J. D., Humrich, A., & Cochrane, L. (1986). Studying depth cues in a three-dimensional computer graphics workstation. International Journal of Man-Machine Studies, 24, 645-657.

Williams, A. D. (1974). 3-D motion picture techniques. American Cinematographer, 55, 420-421.

Zettl, H. (1986). The Graphication of television news and the personification of the news anchor. Paper presented at the Communication Studies Colloquia 1986-87, Concordia University, Montreal, Quebec.

USE OF INNOVATIVE ELECTRONIC MANIPULATION IN STORYTELLING: AN EXAMPLE FROM "thirtySOMETHING"

Ants. A. Leps

Background--

Ever since the introduction of the character generator and the special effects generator (SEG) as tools for television production, the ability to modify some aspects of the image captured by the camera has been available to the program producer. However, within the past half decade the increasing availability, sophistication, and decreasing costs of producing computer generated imagery have radically altered what is feasible for the producer. As always, the technology seems to advance far faster than users are able to catch up and apply these technologies. That, also, has been the case with computer graphics, especially as regards its application to the production of dramatic television programming.

As an art form, computer graphics has made spectacular advances in the past few decades since John Whitney Sr. first started to create animated geometric patterns with the first-generation tube-based computers. The technology is presently on the verge of a major breakthrough with firms like Pixar and Symbolics urging artists toward making full character animation a reality and many industry leaders convincingly arguing that creating complex images electronically may very soon be invariably less expensive than "collecting" similar images with a camera from the real world. The huge turnouts that both the Association of Computing Machinery's Special Interest Group on Computer Graphics (SIGGraph) and the National Computer Graphics Association (NCGA) are both able to attract to their annual gatherings attest to this strength and interest. The work that emerges from the members of these groups is itself also very tantalizing and promising. However, quite surprisingly, the prime technology, namely commercial television production, that has been intimately associated with most of the computer graphics developments, has used most of these resources only in a few clearly circumscribed capacities. These have been in the design of opening sequences and program logos, in the production of ever more sophisticated video commercials, in some music videos, and to a lesser extent in the altering of news footage--something in which there inheres a seriously sinister component. What, until recently, has remained largely unaffected has been the production of dramatic programming.

The Tools--

Essentially three major groupings of electronic tools have evolved for electronic image manipulation. The most obviously impressive have been the image creation devices, most of which emerged from the early work on character generation and Computer Assisted Design (CAD) workstations as well as from the various research oriented design programs developed around the very large mainframe computers, frequently in conjunction with university design departments, such as grew up around the New York Institute of Technology, or from the use of the Cray I and Cray XMP based systems that were put to work by John Whitney Jr. and Gary Demos at their Digital Productions to create imagery such as that for the film, "The Last Starfighter." Alongside these arose a number of exceedingly more sophisticated systems such as the ones made by Bosch, or less expensive desktop gear like the Aurora and the Cubicomp, just to arbitrarily name a few. All of these were, with greater or lesser ease, able to make images that could be as sophisticated as the designer's patience allowed. Many of these could be made nicely three dimensional and could be animated so as to simulate reality more or less successfully.

Another group of tools has developed around the "paint box" concept. Paint box programs, such as those available on personal computers, could also be used to make images, but these images exist as only "painting-like" entities that cannot easily include "objects" capable of being moved about, independently manipulated, and moved for purposes of animation. However, the images created with a paint box can benefit from subtle tonal changes and incorporate all sorts of tools that can be used for copying segments for repetition or replacement of parts of the visual field with other copied parts. Where paintboxes assume interesting dimensions is when these features are brought to bear on "real" images captured by a camera by way of magnetic tape, etc., and then manipulated by the features made feasible by the box. This, of course, can only be done to images that have been digitized, i.e., converted into something the computer can "understand" and manipulate.

This brings in the third tool, namely digital visual recording technology. Until recently, all electronic image signals could only be easily recorded in their analog forms. Although digital video effects generators, or DVEs, (such as Ampex's ADO and Quantel's Mirage systems) had been around for some years and were, in effect, one of the several precursors of the above two technologies, they only "kept" the video signal in its digital form for the duration of the one image frame that was being manipulated, and then quickly reconverted it into its analog form for either transmission downline or for recording. This allowed the image to degrade each time it was manipulated and limited the ease with which progressive manipulations could be made. All this changed radically with the introduction of affordable digital recording and one of its "colleague" technologies, namely component recording--both of which helped greatly to assure that the signal degradation was reduced and the ease of manipulation facilitated. This has been further simplified by the novel concept of the totally digital recorder with no moving parts that can record short passages of picture information into dynamic read only memory (DRAM) chips, thereby allowing nearly instantaneous access to hundreds of frames of television programming that can be repeatedly altered and manipulated at will with almost total imperviousness to any loss in quality.

It is into this environment that the British firm of MCI, Quantel introduced the "Harry" system that ingeniously exploited and extended several of the aspects of the predecessor technologies. Nonetheless, the Harry had been around for a while doing all sorts of service for commercials and news programmers before anyone, other than its creators (who commissioned a very creative demonstration program to help sell its features), seemed to think of using it to communicate dramatic content.

The **Thirty**something Series--

Since its inception, it seemed that viewers either loved or despised this series. The critics, largely, found it meritorious and worthy of praise, and in this writer's opinion, for good reason. Even though there is a lot to be liked about the story line and the attitude towards the audience that the production company projects, one can step beyond that by noting that these television producers have taken upon themselves many challenges in creative image development that others had seemed happy to leave only to film producers to use and seemed to be of little concern to most of those in charge of cranking out an episode a week for the masses hungry for a continuous flow of entertainment programming. Thus, one episode of "**Thirty**something," about a year ago, opens with a long sequence where an overhead camera dwells on a bedroom scene, deliberately giving the viewer a long string of visual and auditory clues that serve to hopelessly distract the viewer's attention until suddenly the actuality is allowed to gel all at once with a few lines of dialogue terminated in a clever and humorous verbal exchange. No one other than a producer/director very interested in exploring new ways to communicate with the audience would ever have gone to the trouble of setting up such a complicated sequence just to get a sophisticated "rise" out of its viewership. But, it seems that it is this group that has taken it upon itself to explore yet another innovative way of handling storytelling content. That occurs in a recent "**Thirty**something" episode in which one of the leading characters, Michael, is depicted in the throes of creative stress while trying his hand at writing fiction.

Michael Writes a Story--

The "first" that this episode appears to accomplish is the use of a string of digital effects to help tell a story. Initially, it appears that the screenwriter for this episode had seen the effects created by a secondary color correction system used during film to video transfers and had assumed it could be used to create most instantaneous color changes such as those in a dress. This turned out not to work satisfactorily, and during postproduction, the editors took the segment in question to a different postproduction firm that offered access to the Quantel digital effects equipment. Once the dress color change was successfully executed, the effects editor realized that many more clever effects could be easily incorporated and went on to not only change the colors but to convey the effect that the color change was visualized as an erasure, coinciding with pencil erasures on the writer's sheet of paper. When the frustrated lead actor tears out a sheet, crumples it and throws it out, the effects editor went further, addressed the scene depicted that frustrated the writer, digitally superimposed that scene onto a sequence of a sheet of paper that was crumpled in the editing facility, videotaped and digitized on the spot, and then with the use of strings of digitally created masks also married those to the visuals. Lastly, using the Harry system's high speed animation features, he created a totally new scene in which the offending action sequence itself is torn out of its context, crumpled and thrown into the trash. The effect is visually very satisfying, and although only slightly over a second long, visualizes the impact of the actor's frustration much more effectively than it was done just by the implied action.

In the preceding case the effects were, in effect, created after the fact--once the essential footage had already been photographed. However, similar effects have been planned beforehand and then, so to speak, painted into the scene in postproduction. One such is the introduction of a lake shore into a take recorded inside a studio. By not attempting to introduce actual water onto the set, the producers saved a bundle. On the other hand, taping a short segment of a watertrap at a golf course and then marrying that into the studio sequence--using a string of masks and deliberate distortions of imagery to lend a character of believability to the end effect--was reportedly relatively quick and inexpensive to execute.

What This Implies--

Although the two preceding examples came about as a result of an initial miscalculation leading to a creative editor's lucky decision to exploit the situation and in the second case a matter of simple economics coupled to awareness of what is feasible, there is nothing--other than inertia--to keep creative visual designers from fully exploiting these new digital electronic tools at their disposal. As entertainment program production budgets go, these technologies are not expensive resources to exploit, but the upcoming generation of producers must come to appreciate the resources at their disposal before they can successfully exploit them. It is time to get more creative producers of visuals to try to expand their creative scope, and not just leave the fun to those involved in the creation of surrealistic rock videos.

SUBLIMINAL SEDUCTION OR VISUAL ILLITERACY?

Ronald E. Sutton

The controversial area of human perception and non-perception needs work. The first problem is to define adequately what is meant by subliminal. Dudley states "it is the individual's ability to perceive and respond to stimuli that are below the limen' or level of consciousness."(6) The limen is a threshold of awareness. Above it stimuli are called supraliminal. Below it stimuli are known as subliminal. The problem is that the threshold is difficult to establish absolutely since it appears to vary from person to person and from time to time in the same person. This means unless the conditions of experimentation are carefully controlled data may be contaminated. In any sample some subjects may be reacting to authentic subliminal stimuli and others to supraliminal. However, through repeated testing for validity, a working limen, or threshold of consciousness, can usually be established.

Norman F. Dixon's Subliminal Perception: The Nature of a Controversy (1971), exposes the reader to the idea that the concept of people being affected by stimuli of which they are not conscious is ancient. He traces it back as far as Democritus, Plato, and Aristotle. He also alludes to Montaigne (1580) and Leibniz (1698). Actual scientific experimentation on the phenomenon of "behavior without awareness" dates back as far as Suslowa's work in 1863 (McConnel, et al). Solid work follows: Pierce and Jastrow (1884), Sidis (1898), replication by Fullerton and Cattell (1892). More examples follow at the turn of the century, especially Dunlop's (1909) subliminal work with the Mueller-Lye illusion. This parade of witnesses to the total or partial effects of subliminal stimuli continues in an unbroken line until 1960. Dixon charts a steady curve of credibility for the phenomenon from 1850 to 1960. In that year credibility plummets.

It is interesting and hardly coincidental that in 1957 Vance Packard wrote a popular book entitled The Hidden Persuaders. It was primarily an expose of how motivational research was being used to encourage American consumers to buy post World War II products. It used colorful and dramatic language to sound a warning:

> This book....is about the large-scale efforts being made, often with impressive success, to channel our unthinking habits, our purchasing decisions, and our thought processes by the use of insights gleaned from psychiatry and the social sciences. Typically these efforts take place beneath our level of awareness; so that the appeals that move us are often in a sense "hidden." (1)

A virtual explosion of comment and criticism followed in both the popular press and the journals of business and psychology. Most of it was designed to debunk Packard's claims. Little acknowledgement was given to the near consensus that had formed just prior to 1960 on the phenomenon of subliminal reception.

Dixon painstakingly charts the slow recovery of credibility again, offering his own study of 1971 as near proof of the existence of the subliminal phenomenon.

> "As a result of being tested in eight different contexts, subliminal stimulation has been shown to affect dreams, memory, adaptation level, conscious perception, verbal behavior, emotional responses, drive related behavior, and perceptual thresholds. In fact, we would only have to accept it as proven in one of these contexts to find it a more than likely explanation of the data from experimentations in the remaining contexts." (320)

Dixon's confidence in the acceptance of the phenomenon was not overwhelming. He had noted the unusual emotional character of past dialogue and debate, but even he must have been shocked by the next series of events.

It was in 1973 that Wilson Bryan Key, a Ph.D of pop media and psychology out of the University of Denver, rocked the bestseller lists with his Subliminal Seduction: Ad Media's Manipulation of a Not so Innocent America. His work made Packard look tame as he asserted in lurid prose that all of us were being manipulated by subliminal stimuli directed into our unconscious minds by the ad men. the corporations, and even the Federal government. The business community and the psychologists alike screamed loudly that he had no proof. Key ignored them. Brushing aside their requests for scientific fact, or verifiable acts of embedding by reformed media manipulators he published two more books with the same charges and more pictures: Media Sexploitation (1976) and The Clam-Plate Orgy: and Other Subliminal Techniques for Manipulating Your Behavior (1980). His fourth book entitled predictably The Age of Manipulation: The Con in Confidence, the Sin in Sincere was published in July of 1989.

On the lecture circuit with each new book, Key is not a serious scholar. He is a man out to make money not prove points with evidence. My source for this insight is personal. After his formal appearance at The American University in the early 80's I asked Key if anyone he interviewed ever actually admitted to airbrushing a four-letter word into ad copy. Even though my question was offered in the friendliest of one-to-one circumstances, Key ignored me. I was the only faculty member in the University to attend his presentation.

In a reprise of McConnel et al (1958), the team of Gable, Wilkens, Harris and Feinberg (1987), set out to prove Key wrong by doing a series of experiments with sexual embeds. Their conclusions are hardly unexpected or surprising. "Although one can not prove the non-existence of a phenomenon by negative results, it is clear that subliminal embedding does not have the power or influence given to it by advocates, such as Key." They found no overwhelming preference for the embedded products. Yet, in a curious bit of doublethink and doublespeak, they acknowledged that Key might have something, "It is difficult for one to avoid being intrigued by the numerous examples of subliminally embedded sexual words and/or symbols in advertising graphics and their dramatic effects cited by Key." (29). How's that for having your scientific cake and eating it too!

As so it goes. If the evidence of the phenomenon is overwhelming according to Dixon, so are the citations I am finding. I have 50 journal citations from 1958-88. There are fifteen books that significantly reference the phenomenon from 1957-85 (inclusive of the "big six" mentioned in my discussion: Packard, Dixon, and the four Keys). A quick check of the popular press yielded one flurry of articles clustered around 1957 and another flurry around the Key publications 1973-83. (See appendix 1 for a list of the Journals and Popular Press organs). And all this is preliminary work. Think what lies ahead with on line Library searches!

There are some problems here. It appears that science and scientists are nervous about the Packard/Key attacks. The business community is likewise aroused, defensive, and angry. Let me illustrate by contrasting two studies that are used in the best overview article in the modern period, Sid. C. Dudley's "Subliminal Advertising: What is the Controversy About?" in the Akron Business and Economic Review.

Dudley outlines four methods of subliminal stimulation. One is the use of a tachistoscope which flashes messages or pictures so rapidly that the viewer is unaware of their presence. Another is the use of accelerated speech in low volume auditory messages. A third is embedding, hiding pictures or words in larger pictures. Fourth and finally is suggestiveness, the image implying quite a bit more than a quick glance would indicate.(6)

The classic example of the first, the tachistoscope, is the Fort Lee, N.J. experiments conducted by James M. Vicary at a drive-in movie theater there over a six-week period in 1956. He flashed two messages, "Drink Coca-Cola" and "Eat Popcorn" on the screen during the film <u>Picnic</u> for 1/3000 of a second every five seconds. He reported that the sales of the drink increased 57.5% and popcorn rose 18.8%. Allegedly, other researchers have not been able to replicate this experiment, full publication of the test has never been offered by Vicary, and there exists a paucity of controls on other variables such as weather, the film itself, etc.,: these are the main reasons usually given for there being no scientific confidence in the most famous of the tachistoscope attempts.

However, just four years later, in 1960, Zuckerman's experiment with student nurses seems to provide quite striking evidence that subliminal commands via a tachistoscope were effective. Quoting from Dixon "Subjects were asked to write stories evoked by perception of TAT cards. If the picture in question bore the subliminal exhortation, Don't write', they wrote shorter stories than if it bore nothing or the words, `Write more'."(49) When the same commands were presented as supra liminals, they had no effect---an interesting control.

Could it be that the linking of the subliminal suggestion with Coke and Popcorn is threatening to us and our power elite, whereas, having students write more or less, arouses no passion in us? A question of values and priorities perhaps.

Dixon catches it right when he concludes in his 1971 epilogue that if true, there is a latent fear that dabbling in subliminals might pose a threat to personal liberty. The right to be a shoplifter in Blooomingdales may be taken out of our hands as we are told along with the music to go with our upright feelings and be honest about not taking the merchandise. I admit it certainly has an Orwellian feel to me, whether it's legal or not.

"So deeply rooted is this distaste for the idea of external unperceived control (particularly in a culture which sets the goal of personal freedom above all else) that it is understandable that there should have been so many attempts to cast doubts on the validity of this intriguing phenomenon which has continued to confront and in some cases affront, twentieth century psychologists." (Dixon - 322)

Finally, what has this all to do with visual literacy? When we deal with true subliminals, almost nothing. When stimuli are directed into the unconscious by tachistoscope or through accelerated speech, there is little we can do because we have no idea what is happening. About the only comfort would be to know that by being aware and relaxed around audio-visual material, we might change the threshold for subliminals slightly in our favor--a small comfort.

But even this preliminary investigation leads me to conclude that in anything supraliminal, as well as Dudley's fourth category of suggestiveness, i.e. "a picture implying much more than a quick glance would indicate," being visually literate is an excellent defense against manipulation.

Understanding and studying the basic elements of design (dot, line, shape, texture, color, dimension, scale, direction, movement, and tone); composition; representational, symbolic, and abstract imagery; figure-ground configurations; space and volume: learning to employ all of these elements in one or more media would be a significant place to start. Knowing how photography, film, and video work can be a healthy antidote against media manipulation.

To test these insights out, pick perfume, liquor, car, and fashion ads. Look closely at them in the light of the ideas I've developed. Try examining ones in newspapers and magazines as well as those on television. By examining them closely and analyzing their form and style, much of the subliminal effect can be defused.

For it is my conviction, yet to be proven by further work with the sources, that the major concern of the Vance Packards and Wilson Bryan Keys is that people should learn about visual communication as it has evolved in our world culture. McLuhan's warning that the medium does drastically shape the message needs attention. That, not academic wild goose chases after conspiratorial boogie ad men and women, is the important task.

REFERENCES

Cohen, Joel B., Ed. (1972). Behavioral Science Foundations of Consumer Behavior. NY: The Free Press, Collier MacMillan.

Dixon, N.F. (1971). Subliminal Perception: The Nature of a Controversy. NY: McGraw Hill.

Dudley, S.C. (1987). Subliminal advertising: what is the controversy about? Akron Business and Economic Review. 18(2), 6-18.

Gable, M., & Wilkens, H.T., & Harris, L., & Feinberg, R. (1987).

An evaluation of subliminal embedded sexual stimuli in graphics. Journal of Advertising. 16 (winter), 26-34.

Key. W.B. (1973). Subliminal Seduction: Ad Medias Manipulation of a Not So Innocent America. Englewood Cliffs, N.J.: Prentice-Hall.

___, (1976). Media Sexploitation. Englewood Cliffs, N.J. Prentice-Hall.

___, (1980) The Clam Plate Orgy and other Subliminals the Media Use to Manipulate Your Body. Englewood Cliffs, N.J.: Prentice-Hall.

___, (1989) The Age of Manipulation: the Con in Confidence, the Sin in Sincere. NY: Henry Holt.

McConnell, J.V., & Cutler, R.I. & McNeil, E.B. (1958). Subliminal stimulation: An overview. The American Psychologist. 13(3) May 229-42.

Packard, V. (1957) The Hidden Persuaders. NY: McKay. (1980). Signet Pub. with Intro. & Epilogue revised.

Zuckerman, M. (1960). The effect of subliminal and supraliminal suggestion on verbal productivity. Journal of Abnormal and Social Psychology, 60(3) Sum., 404-411.

APPENDIX 1

Journal citations include: *American Journal of Psychology*, *Journal of Abnormal Psychology*, *Journal of Psychology*, *Journal of Experimental Psychology*, *Journal of Applied Psychology*, *Psychological Bulletin*, *American Psychologist*, plus *Journal of Advertising Research*, *Journal of Advertising*, *Journal of Marketing*, *Marketing and Media Decisions*, *Journal of Marketing Research*, *Marketing News*, *Journal of Business Ethics*, *Advertising Age*, *Research in Action*, *Journal of the Academy of Marketing Sciences*, *Journal of Communications*, *Public Opinion Quarterly*, *Science News*, *Journal of Consumer Research*.

Popular Press organs include: *Business Week*, *Life*, *Nation*, *New Yorker*, *Detroit Free Press*, *Wall Street Journal* (many articles), *Psychology Today*, *N.Y. Times*, *Chicago Daily News*, *Money*, *Time*.

ADVERTISING AND PERSUASION: FROM "LOGICAL" ARGUMENTATION TO SEDUCTIVE AMBIGUITY

Denise Kervin

Bombarded daily by advertisements, we may be unaware of the work done both by advertising creators to gain our attention and positive responses, and by ourselves as we decode and interpret advertisements. This presentation focuses on the work of constructing *and* interpreting advertisements, a focus spurred by current trends observed in television and magazine advertising's appeals to consumers. Today, persuasive strategies range from traditionally clear and even logical arguments relying on codes using seemingly "objective" information and addressing the consumer primarily as a rational person, to newer ambiguous uses of visual and verbal information that primarily address the consumer's feelings and desires. This trend toward ambiguity is not confined to advertising, but can also be found in other media products, such as some music videos and films. Specifically, this presentation investigates this trend by examining some of the persuasive arguments and techniques used in advertising, asking in effect: how does advertising address consumers, using semiotics as a way to approach such meaning creation? It then outlines research on the mental processing triggered by these messages within the decoder. Finally, implications of the range of persuasive strategies in use today will be suggested, both in terms of the individual consumer and society as a whole.

While advertising surrounds us and permeates our daily lives, the usual tendency is to dismiss it as not worthy of critical analysis. Like film and television before it, advertising seems too crass, too commercial; it cannot even lay claim to being an art form, or the most popular entertainment medium. However, the very ubiquitousness and acceptance (begrudging though it may be) of advertisements suggests we should understand *if* and *how* they "work" on consumers. In a larger sense advertisements can also be seen as occupying an ideological position similar to film and television: all involve the recurring and changing use of dominant, sometimes oppositional, social knowledge and codes, providing a glimpse into current concerns and ideas. Advertising does differ from film and television, especially in its incredible condensing and intensification of information and assumptions. Not having ninety minutes, nor even half an hour, to create characters and lay out a storyline, advertisements must distill and encapsulate social knowledge, requiring readers to "fill in" what is not presented. The result, according to Leiss, et al (1986: 156), is that advertisers (the manufacturers of products advertised) work "to tap the reservoirs of social and cultural knowledge maintained by audiences."

This is not to imply that advertisements, or any other system of meanings, *reflect* society, but to acknowledge that such systems draw from contemporary ideas, feelings, fears -- complete with their contradictions -- and work them through contemporary codes of presentation. As Gitlin (1986) points out, advertising is a product of advertising agencies using their marketing information and creative team's ideas, interacting with client wishes, all aiming at communicating a particular message to a larger or smaller group of consumers. Because each of these parties exists within society, they must rely on social knowledge to create and understand advertising messages. The effects of such messages are profound, as a popular advertising text puts it:

> [Advertising] provides us with constant stimulation, reminders, judgments, and guidance, not only about what products we ought to own but about the kinds of people we ought to consider attractive, the kinds of places we should want to live in, and the standards we should observe in our dress or way of speaking (Bogart 1984: ix).

Of course, while this implies that advertising is mainly a conservative force in society, reinforcing dominant beliefs and modes of behavior, theoretically advertisements can challenge the status quo, presenting alternative visions of reality.

An additional argument in favor of critically analyzing advertising derives from its assumed economic importance and, therefore, likely continuance. While the direct effect of advertisements on the purchase of goods is unclear (Weilbacher 1979: 634), advertising is still seen as the oil that keeps the wheels of our economy turning. As an advertising textbook puts it: "The enormous quantity of consumer goods produced in a capitalist society requires high personal consumption rates to keep the system moving" (Heighton and Cunningham 1984: 119). It is advertising's function to interest consumers in purchasing these goods and most companies believe rightly or wrongly that they must advertise in order to survive financially. Advertising, therefore, bridges culture and capitalism, combining social knowledge and market concerns.

CONTEXT AND CODES

All advertisements, through their use of codes -- the rules guiding choice and arrangement of elements within a message --

create a context for their products. Traditionally, advertisements have been constructed to place their products in a positive context, juxtaposing goods with people and objects our society considers important and desirable (Williamson 1978). Such contexts involve visual, verbal, and/or aural codes, including the type of argument used to structure the advertisement, usually drawing on standard "appeals," such as the desire for love, security, self-esteem, and sensory stimulation (Heighton and Cunningham, 1984: 113-121). These appeals are, of course, social values: the concepts, feelings, and states of being that the dominant culture holds as important and that essentially function as goals (Sproule, 1980: 187-188). It is the aim of advertising to link products and values, promising the latter through possession of the former, although the product-value connection might not be promised outright, since overt claims may have to be inconveniently proved. Advertisements' structures, therefore, *implicitly* encourage consumers to make that connection themselves within the reading process.

To put the above in semiotic terms: an advertisement brings together certain signs, such as images of people and locations, and through the structure of the advertisement encourages the reader to make a connection between those signs' connotations, pointing to social values, and the product being advertised (Williamson, 1978: 19). Advertising creators rely on current (and even historical) visual, verbal and aural codes in constructing an advertisement. The aim of such coding is to have the consumer read the advertisement, interpret the connotations and, through the connotations, link the product to their values. For example, a television commercial for an expensive car may try to appeal to values such as self-esteem and a desire for success. Visually, these values might be connoted by representing the auto as carefully crafted (using a lighting code that accentuates the car's sleek lines) and as working flawlessly (using a low camera angle to increase the car's perceived speed). The commercial could, therefore, work to encourage a reader to see this vehicle as an impressive piece of machinery that an important and successful person would own. That interpretation is dependent upon the reader understanding the codes and their connotations as intended by the advertisement's creators, an outcome by no means assured.

To illustrate more concretely how visual, verbal, and aural codes operate and are guided by the values being appealed to within advertisements, a 1986 advertisement for Chaps, a man's cologne, can be examined. The values that the advertisement attempts to link with the product seem to include self-sufficiency and control, with its visual and verbal references to a rather unemotional man and son, safaris, and challenging nature. The need to link the product with such traditional masculine values derives in part from the association of scent mainly with females. The creators of the Chaps advertisement have relied on codes that affect the look of the photograph, the use of the models within it, and the accompanying verbal information, all in order to link these masculine values implicitly to the product. For example, a code of "realism" guides subcodes such as color, with the use of dull, earthy hues and lack of saturation, as well as lighting, which is used to imply that it is daytime outdoors. Complementing the code of realism is one guiding the presentation of the models, visually and verbally suggesting masculinity deriving from social assumptions about gender differences. Society teaches in various explicit and implicit ways that males and females act, think, and present themselves differently; those masculine and feminine codes in society are reproduced (and often exaggerated) within advertisements' and other media products' coding. An important subcode of masculine presentation within the Chaps advertisement is nonverbal behavior, as the "father and son" look assertively into the camera and so at the viewer, both with their hands on their hips in a confident, no-nonsense stance. This is stereotypical masculine coding, offering connotations of independence and power.

The key to understanding advertisements, it can be argued, is values, chosen because advertisers and advertisement creators believe these social beliefs hold positive meaning for the audience being targeted. These values then help to determine the codes and subcodes used, which in turn determine the individual signs encoded. These signs provide both denotative or literal meanings (here are a man and a boy standing in front of a tent) and connotative, or implicit, meanings (here are an adventurous father and son facing danger together at their campsite in the wild). The values chosen exert a decided control over all levels of meaning within the advertisement, from who and what is chosen to appear, to how they are specifically encoded to look. The images within advertisements are therefore usually carefully planned to "guide" the viewer's understanding, to encourage the linking of product and value within the reader's mind. In addition, advertisements usually provide headlines and/or a certain amount of copy to help guide readers toward the "correct" understanding of the image's denotative level and so toward the interpretation of its connotative level (Barthes, 1977: 40). Thus, the headline in the Chaps advertisement "anchors" the photograph's meaning: "Living Without Boundaries" reinforces the image's coding, again suggesting connotations of masculine adventure and challenge.

The values that advertisements rely upon are usually widely accepted and taken for granted within society. While these dominant cultural beliefs do change, an examination of advertisement's history shows that the values referred to in today's advertisements have been popular for decades, as Leiss, et all (1986) discovered. What has changed over time is how advertisements *look* -- the verbal, aural, and visual codes used -- since advertising responds to trends within other media and technologies. For example, advertising has moved from primarily using drawings to using photographs, largely because of changes in the photographic and reproductive processes. In part, this stability of values and the shift in the codes used comes from advertisers assuming that they are communicating to uninterested readers and have only a few seconds to make their point. Traditionally, this has meant that advertisements have linked products to stable, widely accepted values, while combining certain current codes for attracting attention and maintaining interest with other long-used codes to ensure speedy understanding and, perhaps, easier acceptance.

In encoding advertisements for different markets, advertising creators choose codes thought to be understood by and appeal to the particular market addressed (Leiss, et al, 1986: 159). The variance in familiarity with and liking of codes by readers depends upon factors within a person's life, such as age, gender, economic status, education, and past experiences. Advertising creators are very aware of who they are creating an advertisement for and what that audience will probably understand, as well as what it prefers. In other words, advertisements are created to address their readers in familiar terms, assuming certain beliefs and likes. Of course, it does not automatically follow that a consumer is the way he or she is "spoken to." For example, the Chaps advertisement seems designed for readers who understand codes that imply manliness and high adventure and who also accept those values as worth pursuing, at least through one's cologne.

Part of the power of codes is that they are not specific to a single advertisement, but are "intertextual" in nature, opening up the message and referring readers to other texts and cultural meanings (Silverman 1983: 239; Barthes 1974). For example, the clothing of the Chaps models derives from a variety of sources such as safari gear and military uniforms. Of course, not all readers of the advertisement will decode the implications of this intertextual coding just as its creators desire. Some viewers may come away with connotations of the Boy Scouts, for instance, although that does not make the advertisement necessarily a failure. What this does indicate is that a certain group of readers is being addressed fairly specifically, a group to which the cologne is marketed: possibly middle or upper middle class males with knowledge about and approval of traditional male pursuits, as encoded across various cultural products, such as films, television, and literature. A woman reading the advertisement, for example, may have no trouble decoding the denotative and connotative levels of meaning, or understanding the cultural values being used, but she may still reject the advertisement as ludicrous, misguided, or simply alien to her world view. Or, she may feel the advertisement "speaks to" her in terms of a man in her life and be persuaded to buy him the cologne. Codes, therefore, traverse various media and messages, and are read by different audience members as more or less "matching" their experience of the world.

ARGUMENTS: RATIONAL VERSUS EMOTIONAL APPEALS

According to texts explaining the advertising process, an advertisement begins with information about the product and about the potential consumer. Advertising until about the 1950s mainly stressed the good's characteristics and benefits. Emphasis gradually shifted to gathering and applying information about purchasers: who were they, why did they buy a particular brand, which appeals would entice them to a new brand (Leiss et al 1986: 151)? Today, consumer research is a thriving industry with departments in advertising agencies, independent companies supplying data, and even academic research and journals devoted to the subject. Knowledge about consumers ranges from traditional demographics, such as age, income, education, to psychographic, or "lifestyle," information, describing people according to their beliefs and actions. For example, Heighton and Cunningham (1984) discuss how early Merrill Lynch commercials revolved around a "Bullish on America" theme aimed mistakenly at "belongers": "conformists who are unlikely to take risks." After changing agencies, this campaign was shifted to appeal to heavy investors who were addressed (and presumably see themselves) as "achievers -- self-confident unique individuals" (69). Essentially, the first campaign was based on values having little, or negative, meaning for the consumers being addressed, a situation rectified when the new, more appropriate, group was "spoken to." Such information helps determine how an advertisement will be encoded: what visual, verbal, and/or aural codes will be used and what kind of argument(s) will structure the message.

In creating contexts for products that will appeal to the target audience, advertisements can use arguments that depend more or less on logic or emotion. One definition of argumentation is: "persuasive communication which employs reasoned discourse as its principal form of support. This means that even though some emotional and personal proofs are used, they are set in logical frameworks which impose at least a modicum of rigor upon the arguments" (Mills 1964: 3). The literature from rhetoric suggests that arguments can vary as to how clearly a proposition is presented and as to the weight given to logical versus emotional proofs, the former able to be objectively verified, the latter verifiable only subjectively. Aristotle's three avenues of persuasion open to a speaker delineate persuasive techniques in arguments as: ethos, exhibitions of the communicator's credibility; pathos, emotional appeals; and logos, support of a logical nature (Mills 1964: 5). Arguments can rely on one to all three proofs; which one or combination works best depends upon the communicator, message, situation, and audience. Because the focus in this presentation is on television and magazine messages, incorporating visuals with verbal and/or aural information, I propose to add a fourth avenue of persuasion: aesthetic, an appeal to the audience's senses, particularly sight and sound. This is based on the assumption that codes, such as editing style, type of music, and camera usage, have an effect on a reader's decoding of and attitude about a message.

Condensing the above information on encoding advertisements: the audience and product "suggest" what values should be linked to the product through both the values and coding used *and* in the type of argument structuring the advertisement, with differing reliance on logical to emotional proofs. The original impetus for this presentation was observance of advertising in which the "argument" seemed to depend wholly on emotion and the coding was very nonconventional, resulting in a high level of ambiguity. The interaction between arguments, ranging from logical to emotional proofs, and codes, ranging from conventional to nonconventional, can be schematized as:

ARGUMENTS

Logical proofs — Emotional Proofs

Factual — Conventional — **C O D E S**

Narrative

Emotional (Ambiguous) — Nonconventional

Thus, ambiguous advertising falls at the juncture of emotional proofs and nonconventional coding and constitutes the most extreme form of what Winters and Milton (1982: 48-56) call "emotional strategies" in advertising. The advertisements most strongly relying on logic, or "factual" advertisements in Winters and Milton's terms, fall at the juncture of logical proofs and conventional coding. A third category of advertising, suggested by Winters and Milton, falls somewhere in between factual and emotional, using narrative or dramatic structure and varying in terms of reliance on logical or emotional proofs and use of conventional or nonconventional coding. Sometimes an advertisement relies on a mixture of these three categories; for present purposes, commercials and magazine advertisements that fit rather clearly into a single category will be discussed.

In terms of argumentation, factual advertisements are the most overt in presentation of a product and its benefits for the consumer. Rhetorically, the premise of the advertisement is both stated and supporting proof provided; the values linked to the product are usually clear and traditional. The consumer is addressed (to whatever extent) as a rational human being who can be persuaded by the facts. Since a factual advertisement relies the most heavily of the three categories on logical proofs, evidence of different kinds within an advertisement's visual, verbal, and aural channels works to convince the consumer about claims made. Factual advertisements work off of our society's empirical bias, the assumption that "seeing is believing," with confidence invested in "objective facts": statistics, quotations from supposed experts, and examples. Such advertising usually uses conventional realistic visual and verbal/aural codes; aesthetic elements -- lighting, color, composition, camera use, editing, and verbal or aural information -- suggest everyday reality, offering connotations of truthfulness and ordinary life. Emotional appeals and proofs of source credibility are also present in different degrees in factual advertisements, which are often specifically structured through use of demonstrations, comparisons, testimonials and spokespersons.

For example, a magazine advertisement for Puppy Kibbles and Bits relies on a factual argument with an appeal to the consumer's emotions, especially in the visual coding, cued by the headline: "Baby deserves his own special formula." The additional verbal information supplied offers information about the product, while the visual information provides both an illustration of the product and an emotional appeal in the use of cute puppy and signs connoting "baby": a pacifier and pastel colors. This advertisement thus creates a context linking the product with the value of health (for one's pet), addressing its readers as both rational people, concerned with their pets' nutritional needs, and as emotional beings, likely to coo over babies and puppies.

Similarly, a television commercial for Aqua-fresh toothpaste also links the product to health, using the traditional male authority figure (dressed in a blue, not white, coat), lecturing to a "mother and son." The listing of Aqua-fresh's benefits is offered, in both the sound and visual tracks, making for a simple advertisement with very straightforward information, appealing to the consumer's intellect. Of course, while the commercial presents "facts," such as the gingivitis-fighting ability of the product, the only support offered comes from the "pharmacist," who is, of course, simply an actor. In addition, the commercial also appeals to emotions, as in its stress on gum disease to create fear and the urge to buy defenses against it, even utilizing war metaphors in its sound track, such as the term "secret weapon."

The second general category by which advertisements' arguments can be discussed is use of a narrative or dramatization, in which the product or service is more or less central to a story. Logical proofs and source credibility may still be important, but emotional appeals become more central, as characters and a storyline attempt to capture the audience. While advertisements structured using the factual strategy focus on the use *and* benefits and values associated with a product, dramatizations often deal solely with the latter. The audience, therefore, must make the connection between benefits and values with use of the item advertised, since the product's use may never be seen. Coding may range from realistic to fantastic, from mimicking the world, to creating a nonconventional version of it, to presenting an entirely new "reality." For example, a long-running television campaign for a perfume used various examples of a young woman going about her business while attracting a young man's admiring attention. The images suggest that the woman's scent draws the man to her, linking product to the dominant social value of being attractive to the opposite sex. However, the connection between perfume and attraction is suggested only, not put forth in a verbal assertion, as might happen in a factual advertisement. The viewer must bring her or his cultural knowledge to bear on the message to create this meaning, connecting value and product.

In a sense, narratives in advertisements can be seen a proofs or examples of a fictional, not factual, kind. Consumers may or may not see these stories as truthful or based in reality, but may still be drawn by the advertisements' construction of characters and story. Given the importance of stories within our culture and their association with entertainment, narrative advertisements might have an added advantage over factual or even emotional advertising. For example, Pepsi's award-winning advertising campaign starring Michael J. Fox uses a number of stories incorporating the product and linking it to values such as romance and success. One such advertisement places Fox in a library reading room containing, rather incongruously, a soda machine. The narrative involves how Fox, with no money, magically obtains and enjoys a Pepsi. The simple narrative moves the viewer forward through a series of questions, such as: how will Fox get money, will he solve his dilemma? As the viewer's questions gradually are answered he or she is drawn along through the commercial message. Because magazine advertisements are a static medium they can only mimic or suggest the time-line of a narrative. For example, some advertisements use multiple images to suggest a time progression, as in the Virginia Slims campaign. In these advertisements an "historical" photograph, cued as such through codes like fashion and sepia tinting, displays the "past," while a full-color photo of a female dressed in trendy clothes supposedly illustrates women's lot today. Many magazine advertisements with only a single image can also imply a story; for example, most liquor advertisements involve a man, a woman, drinks, and connotations pointing to "things to come."

The third broad category, emotional "arguments," marks the opposite end of the continuum from factual advertisements. There may still be factual information provided and source credibility may still be important, but the focus in these advertisements is on appealing to consumers' emotions and to their senses, often through more nonconventional use of aesthetic coding. The specific techniques used include metaphors and similes -- as in comparing a fabric softener's effect to a sunny day -- and emphasis on symbols, such as flowers to suggest romance or femininity. This category includes a range of advertisements, particularly for fashion and personal grooming products, which have traditionally been advertised differently than more mundane products, such as food and medicine. The former are sold and purchased "on an almost exclusively emotional level. . . . The consumer often subconsciously buys a new self-image along with the product" (Heighton and Cunningham, 1984: 113). Automobile advertising currently is also relying heavily on emotional strategies as well. For example, Chevrolet's "Heartbeat of America" campaign utilizes imagery aimed directly at the heart strings. Family, fun, and patriotism are deftly connoted by the visual track, while excitement and the suggestion of "today" come through on the sound track.

Advertising that appeals to our emotions can do so in clearer and more ambiguous ways, by incorporating some or no logical proofs, relying more on emotional and aesthetic "proofs." Emotional advertising can also use signs and codes with widely shared connotations -- highly intertextual -- or those likely to be read with some difficulty or appreciated by only a small audience. For example, the Chevy commercial's pictures and sounds are highly intertextual, they are found across a diversity of media products and are probably decipherable -- if not agreed with -- by most people in this society. Also clear in its emotional appeal is a Merrill Lynch commercial for investments. The service offered is linked to the values of security and success through an image track showing happy children and a sound track speaking of the future with the musical tag line, "To know no boundaries." Somewhat more ambiguous is the Obsession fragrance television and magazine campaigns, particularly in the visual coding used. The values, while not as obvious as is usual, are still not esoteric, essentially involving sexuality, attractiveness, and love. The codings, however, are unusual, such as in the magazine advertisements' use of color and fragmentation of bodies. Such aesthetic choices are attention-getting, inviting the viewer to explore the advertisement for answers to perceptual questions like "who's elbow is that, what is that shadow?" Unlike factual and (to a lesser extent) narrative advertisements, emotional advertisements often offer little text to anchor meaning. The reader is left to his or her own cultural and social knowledge to connect signs and connotations with the product, which sometimes is not even pictured.

The Levi's 501 jeans campaign has been offering a series of ambiguous commercials over the last few years. One example is entitled, "Lake Charles Louisiana 501." The first time the commercial is seen it seems likely to puzzle the viewer; the visual track contains nonconventional elements, such as images of young men shot in regular speed and slow-motion, and in black and white and color. The sound track offers a male voice-over talking about liking "this place" -- understandable if the commercial's title was noticed, absorbed, and remembered. It is primarily the two times that the "501" name is on screen (at the beginning and end) and the Levi's logo at the end that offer a clue about who is advertising what. The models *are* all wearing jeans, but that fact is not foregrounded and their apparel seems just another aspect of the general scene. Without repeated viewings and careful attention, the values appealed to may seem as ambiguous as the visual and aural coding. Across the Levi's 501 campaign various parts of the country are characterized (Texas is another) and feelings about the areas, and life in general, are offered by supposedly indigenous males. These visual and aural signs might suggest values such as camaraderie, the beauty of nature, and fun. Still such meanings are much less clearly presented than in other campaigns.

A print advertisement for Sebastian make-up involves increased ambiguity in both values, "argument," and coding. It is unclear exactly what values the advertisement is attempting to link to the product within the image. The predominant appeals within most make-up advertisements are to the desire for beauty, sexuality and love; the usual signs connoting such are either missing here or greatly altered. At the same time, the visual codes upon which the advertisement relies to capture attention diverge from convention. Certain signs are recognizable basically because most readers know how to decode a photograph: there is a head with perhaps a shoulder, lying on what seems to be a pile of papers. Most readers will also understand that *something* is for sale, simply because of the fact that it is a woman's face represented in the image, and, historically, women have been used to sell things (Pollock 1977: 28). Denotatively, the advertisement's visual component cannot be read much further because more information is absent. Turning to the copy running alongside the photo, a degree of anchorage is provided by references to "my **imagination**," and "my vivid sense of **fantasy**." These words suggest that the photograph is not meant to be taken literally, as realistic, but perhaps seen as a dream image, a vision from the imagination. This text tends to guide the reader away from, for example, seeing a head separated from a body, perhaps connoting dismemberment and death. But beyond indicating that the image is not to be read literally and that non-realistic codes are being used, the copy is not helpful for arriving at a clear decoding. This message, like certain films and music videos, has "a compelling visual/aural design that is perceptually insistent, but semantically uncertain or in suspension" (Bergstrom 1986: 38).

It is difficult to call an advertisement such as this an "argument." Instead of rational appeals striving for objectivity, or even stories involving emotional appeals, such ambiguous advertisements aim at consumers' feelings, dreams, fears, senses, and even vaguer impulses. And, while all three categories of advertising rely on visual and verbal/aural codes to create certain connotations and thus values to be linked to a product, factual, narrative, and most emotional advertisements offer important denotative information, facts, or characters in a story that must be understood. The ambiguous emotional advertisement, however, seems to "force" the reader to go beyond a denotative reading, such as "head on papers" in the Sebastian advertisement, to the level of connotations in order to get any meaning from the message. In moving beyond the denotative level of meaning, perhaps some viewers will rely on nonrealistic codes of representation found in art works, creating connotations of transcendental beauty, as the female face becomes a "work of art," dehumanized and objectified. Other readers may create similar connotations by seeing the female face as available for decoration and "improvement" in order to achieve greater conventional beauty. While beauty is a traditional value within advertising, especially in advertisements for cosmetics, usually the codes linking value and product are much more realistic and conventional. Many viewers of the advertisement may simply consume it as an aesthetic experience -- creating vague and very personal connotations from it. Of course, the nonconventional coding is certainly not likely to appeal to all readers, in part because of the ambiguity on the denotative level and "openness" of interpretation on the connotative level. For other consumers this ambiguity might be quite appealing and may even mean that the product name will be placed in memory.

READING ADVERTISEMENTS

As Ewen (1976) has pointed out, in the early years of the twentieth century people had to be "educated" about the new products and processes being introduced as a result of industrialization. Advertising was a major means of this teaching, as advertisements described and displayed new goods. Of course, as with any other new message system, such as film, audiences were initially involved in learning the codes used by advertising. While at first fairly simple, with text alone or a drawing of the product with its description, advertisements quickly became both more complex and more subtle. As advertising matured as a business, new codes were continually introduced, building on consumers' previous knowledge of advertisements and attempting to offer something different. From early in advertising's history, advertisements could be seen falling along the continuum from straightforward arguments to ambiguous appeals and aesthetic choices. The question to be explored now is: how do these different types of advertisements get read by consumers and what are the social implications of such information processing?

Advertising researchers are interested in how people process advertisements in order to create more effective messages, ones that encourage a positive attitude about a company and, more importantly, encourage purchase of its products and not the competition's. To understand information processing, advertising researchers rely heavily on information theory and cognitive psychology. Such advertising research offers different conceptualizations of the particular processes operating within the consumer in reaction to advertisements. One theory holds that a sufficiently meaningful advertisement will cause attitude change and result in a behavior: consumption of the product. This learning theory approach sees advertisement readers as more or less active and involved in information-seeking about products. Determining factors in that information-seeking seem to be the importance the product holds for a person and how much difference is perceived between competing brands. A different, though not necessarily contradictory, theory seen the consumer as having only a low level of involvement -- that is, not mentally connecting aspects of a message to one's own life -- with advertising and little interest in information-seeking. The assumption is that "a great deal of advertising information is absorbed by the consumer without conscious search, appraisal, or resistance. The advertising is neither evaluated not processed into new or revised attitudes; it simply goes into storage" (Weilbacher 1979: 643). The influence of advertising, according to this theory, comes from repetition, which increases a consumer's awareness of a brand and possibly spurs purchase. Krugman (1965) contends the low-level theory is especially applicable to television advertising and its decoding by viewers. In a later article, Krugman (1971) adds that print advertising seems to evoke more personal connections, meaning more involvement, than television advertising (3). This second view of advertisement processing rearranges the learning -- attitude change -- behavior sequence assumed in the first theory. Low involvement theory holds that learning may result in a behavior (purchasing), which then may cause an attitude change. A combination of ideas within each of these theories seems to offer the most complete picture of how advertisements are processed.

Theories of reading thus suggest that there are different levels of attention and corresponding levels of work that consumers go through when confronted by media products. Involvement with an advertisement depends on a number of elements including: a person's state of mind (tired or alert, interested in buying the product or not), the situation in which viewing takes place (noisy versus quiet), and characteristics of the message in relation to the viewer (first time seen or twentieth, using familiar or new codes). According to Greenwald and Leavitt (1984), there are four levels of "involvement" possible with an advertisement, beginning with attention on an almost unconscious level, moving to high involvement and interaction with the message in order to produce understanding, resulting in information retention. The first level is called "preattention," which "functions to monitor background stimulation for the occurrence of novel or significant events" (Greenwald & Leavitt 587). This process seems automatic, using little mental capacity and having little cognitive complexity. In terms of reading advertisements, consumers probably often flip through magazine pages or "watch" television commercials at the preattention level, until a message "breaks through" by using a "novel or significant" element. Such elements can include unusual imagery, such as nudity, or verbal/aural "hooks," such as the popular trend of classic rock songs.

Once attention has been captured, the second level of involvement is triggered, *if* the consumer deems the message important enough for further processing. "Focal attention" is the process that "uses modest capacity to focus on one message source, and to decipher the message's sensory content into categorical codes (object, name, word)" (Greenwald & Leavitt 584). This level of cognitive activity is often the best that advertisers can hope for, although this may not necessarily be negative. Research suggests that affective reactions to messages at this level may be stored, placed into memory and, with continued exposures to the same information, reinforced. This seems particularly true for visual information, which requires less conscious work and cognitive activity than does verbal information (Chestnut 1980: 275). "Pictures in general are more attention-getting, pleasant and easier to process that is verbal text. Consequently, viewers attend more to the picture and tend to expend less processing resources on the more effortful verbal text" (Edell & Staelin 1983: 46).

The third level of involvement is "comprehension," in which the reader "analyzes speech or text by constructing a propositional representation of it" (Greenwald & Leavitt 584). At this stage of information processing, readers must choose a single channel to focus on: visual or verbal. Given that the latter type of information requires more work, it seems that a magazine or television commercial's visual information will capture the bulk of attention. There is a greater likelihood that a message will be established in memory than at the second level, where more repetitions are needed. However, this information may be difficult to draw from memory because the "message's propositional content is unintegrated with existing knowledge" (Greenwald & Leavitt 588). In other words, the reader has not given the information adequate thought for it to be related to previously-learned information.

The fourth, and most complex, level of involvement is "elaboration," during which a reader interacts with, thinks about and relates to a message. This level requires "more capacity to enable the integration of message content with the audience member's existing conceptual knowledge" (Greenwald & Leavitt 584). Readers presumably approach media products that they have actively chosen to consume, such as films, at this level. It can be assumed that some, but not much, of the advertising a person is exposed to daily is processed via elaboration. Only those advertisements get elaborated that, for reasons internal to the message and the reader, capture and hold the viewer's attention; most advertisements are not given that much cognitive processing. Because of the complex cognitive processes involved in elaboration, the information is more likely to be stored in long-term memory and so have an effect on a person's attitudes. Not surprisingly, therefore, high involvement with a message can result in belief modification, either toward acceptance or rejection (Greenwald & Leavitt 582).

The above discussion of cognitive processing generalizes the activity, ignoring the individual reading situations of people as they decode advertisements and other media products and create meanings. Reading messages must be placed in a social and ideological, as well as a psychological, context. Each person brings to a reading situation his or her own background, personal history, and social position. For example, if she is thinking of buying a car, a woman's interaction with car commercials will be different that if she has no interest in such a purchase, or if she recently bought one. A man socialized to consider women as objects of visual pleasure will decode Obsession's naked females differently than another man who rejects sexual objectification. The reading process is thus, in a sense, interactive: an advertisement is structured in a certain way, using codes and values assumed to "speak to" a larger or smaller desired audience; viewers read the advertisement "through" their experiences and beliefs, accepting or rejecting the position created for them by the message. The "fit" between most advertisements' "preferred" reading -- how they ask to be read by their target audience -- and a viewer's actual meaning creation can range from a complete match, to absolute incomprehension, to understanding but rejection (Morley 1980: 159). Ambiguous advertising, it seems, increases chances of the latter two responses, as codes and even values become nonconventional and unclear. The level of involvement reached and the meanings created, therefore, should be seen as the result of factors involving both the advertisement *and* the reader.

Given the above discussion outlining the suggested continuum of advertisements and the cognitive and social aspects whereby messages are read, what can be hypothesized about consumers' decoding of different advertisements and the effects of such messages? First, it has been suggested that most people have low involvement with advertisements, flipping past them in magazines and leaving the room (mentally or physically) when television commercials come on. Advertisement creators, knowing this, often encode their messages using techniques that promise to gain attention and then encourage involvement at higher levels of cognition. Since novel information causes such a shift, this may explain one incentive behind ambiguous advertisements' use of nonconventional codes, such as faster editing and unusual lighting. Of course, "novel" aesthetic choices must periodically change: enough repetition of these codes will condition consumers to them, requiring a new (or perhaps previously "old") set of techniques. Second, if an advertisement does capture an audience member's attention and factors within that person result in high involvement, then two important processes take place. The viewer interacts with the advertisement to the point where learning can take place and the advertisement's information placed in memory, perhaps triggered when that person sees the advertised product for sale. This level of cognitive activity can result in the viewer accepting *or* rejecting that information. Thus, high involvement is a double-edged sword for advertisers: they have readers' attention and can place the product into their memories, but those consumers may turn thumbs down on what is presented.

Focusing on the three types of advertisements outlined earlier, advertising that falls on the "factual argument" end of the proposed continuum presents the most straightforward information in terms of cognitive processing. Facts, or "pseudofacts," may be listened to or read, demonstrations or comparisons viewed. The coding usually works to connote reality and objectivity; the context linking products to values is usually clearly delineated. In short, in different ways and to differing degrees, the consumer is addressed as a rational being able to judge and decide. Usually the verbal information interacts with and reinforces the visual information, so the viewer is guided in how to decode the images by what is read or heard; the viewers, of course, interpret what they see and hear based on their history and beliefs. At the elaboration level of cognitive processing, the reader accepts or rejects the information offered. For example a commercial demonstrating how a detergent cleans "tough stains" may elicit "counterarguments," mental reactions that refute a message's assertions, support the reader's position, or denigrate the communicator (Burgoon & Bettinghaus 1980: 160). A viewer of the detergent commercial may counterargue that the stain is not really the type claimed, or something beside the soap was added to cause the stain to disappear.

When involvement does not reach this highest level, then research points to other effects. If comprehension is triggered, then the consumer may have "message-based persuasion effects" (Greenwald & Leavitt 1984: 588), whereby information from the message is stored without having been actively interacted with. Learning has not occurred to the extent as during elaboration, but the advertisers have avoided overt rejection. If involvement only gets to the focal attention level, the literature suggests that the result can be "affective conditioning" (Greenwald & Leavitt 588), whereby a consumer is "primed" to feel positively (or, presumably, negatively, depending on the person and the message) about a product. Such an effect depends on how the person feels about the context in which the product is placed and also on his or her being exposed to multiple repetitions of the advertisement.

Turning to the other two categories of advertisements discussed earlier, narrative and emotional, how a reader processes their information depends, again, on reader attributes, aspects of the messages, and level of involvement. If involvement is high, then the reader actively interacts with the advertisement, bringing in past experiences and beliefs to judge the message. For example, a teenaged girl watching the perfume commercial mentioned above for the first time may be highly involved, actually thinking about the message and its story of boy pursuing girl. Depending on how this story, the appearances of the actors, use of aesthetic elements, and so on "speak to" the girl watching, she may think positively or negatively about the perfume. Of course, although she may be thinking about it, there is no guarantee that she will act on that thought and purchase the product. But the amount of cognitive processing given the commercial suggests it may leave something behind. If positively decoded, the girl may incorporate the scenario of women using products to attract men into her belief system, or it may simply reinforce similar ideas already held. If negatively decoded, the commercial's meanings may be rejected and so not become part of the viewer's beliefs. There may also be decodings involving acceptance of some ideas within the commercial, while others are rejected.

Greenwald and Leavitt (1984) point out that processing advertisements at the elaboration level makes sense for some products, but not all; that is, some advertisers ought to want *less* overt thinking about their goods than others. Major purchases, such as cars, are shopped for and bought in manufacturer-specific locations, often after considerable thought and perhaps research. Advertisers for cars, therefore, would theoretically want readers' involvement at the elaboration level, with their information stored in memory, able to be recalled and acted on (such as test-driving a particular car), with possible modifications to beliefs and attitudes, *prior* to purchase. Other products, such as personal care items or foods, are bought in stores from displays with competing brands side by side; these also tend to be purchases consumers do not give much thought to. Greenwald and Leavitt suggest such items really only require processing to the level of comprehension (the third level) or even focal attention (the second level), cuing recognition when the consumer is confronted with the advertised product on the store shelf (590). Again this recognition comes from repeated exposure to the message, and beliefs or attitudes may be affected only *after* a person actually purchases and tries a product. Thus, a consumer is "primed" to notice an item, not through a process of conscious thought and decision, but because of repetitions during low involvement.

The literature suggests some interesting cognitive processes may be at work in ambiguous advertisements' reading. Such advertisements use nonconventional codes in order to gain attention and distinguish themselves from other products' more conventional messages. These advertisements, as well as certain films and music videos invite "dense, perceptual involvement" (Bergstrom 1986: 38). The nature of that involvement needs to be clarified, however. Initially, at least, such messages would seem likely to achieve the elaboration level of cognitive processing from some consumers, as these viewers' attention is caught and they attempt to make sense of the advertisements. However, the very techniques that invite such close attention may actually block a reader from critically thinking about the message presented. First, "distractors" in a message "may occupy enough attentional capacity to interfere with cognitive processing," shifting involvement from elaboration to comprehension (Greenwald & Leavitt 1984: 586). Distractors include nonconventional coding choices, visual and verbal/aural elements requiring concentration, but perhaps ultimately impossible to clearly understand. Second, such coding choices may cause high "arousal": "a state of wakefulness, general preparation, or excitement" (Greenwald & Leavitt 583). Research suggests that strong arousal may disrupt elaboration, presumably causing processing to continue at a lower and less critical level of involvement. Third, unless there is interaction between visual and verbal/aural information, with the text essentially anchoring the visuals' meanings, readers' thoughts are often unrelated to any kind of evaluation. The pictures may instead cue personal memories or thoughts having nothing to do with the product or brand. Such distractions "lead consumers to spend less effort critically thinking about the attributes they normally would use to evaluate the brand's . . . claim" (Edell & Staelin 1983: 47).

CONCLUSIONS

Research into the processing of advertisements suggests several ideas of consequence for individual audience members and society. Considering advertising as a whole, it is probably safe to say that most gets processed at a low level of involvement. This means that the messages -- whether factual, narrative or emotional -- are not critically thought about with no counterarguments generated. While learning is not taking place, since the elaboration level has not been reached, the audience *is* being readied to recognize elements of such advertising with repetition. As Krugman (1965) argues, advertisements eliciting low involvement do not persuade, in that a person's ideas are not immediately changed in reaction to the message. Instead, the process is slower, with some information gradually seeping into long-term memory with enough exposures. Such a situation should not be taken as evidence of a covert and insidious form of mind control by advertisers. The effects of advertisements vary greatly, dependent on an individual, her or his situation, the particular advertisement, and so on. What this does mean, though, is that effects resulting from low involvement are much more subtle and cumulative than often thought and that what power advertising has comes from its pervasiveness and repetition of values.

Turning specifically to ambiguous advertisements, it has been suggested that their nonconventional coding and values may invite attention at the elaboration level of cognitive processing. A factual, narrative or nonambiguous emotional advertisement may be overtly accepted or rejected because it is critically assessed. It seems reasonable that of the different types of advertising, factual advertisements processed at the elaboration level can be designated as the most straightforward of rational information processing. At the opposite end of rational thinking are ambiguous advertisements. Even if they initially receive attention at the highest level of processing, their coding "pushes" the reader to a less critical level. What seems to happen, in semiotic terms, is that the audience is forced away from any examination of meanings on the denotative level to mainly engaging these messages connotatively, through emotions and vague impressions. This type of advertising seems in particular to suppress consumers' critical thinking, appealing primarily to senses and feelings. Of course, a range of reactions to ambiguity is to be expected; some viewers will be alienated by the unusual codings, for example, and refuse their attention entirely, while others will find the new style promises something different and special. Again, interpretations depend on the interaction between the reader and the advertisement. The same viewer may have widely different reactions to various ambiguous advertisements, such as the Levi's campaign versus a campaign like "The Night Belongs To Michelob," with its rock sound track and images of urban life.

Ultimately, advertising's effects cannot be seen in isolation; advertisements are part of society's meaning systems incorporated in language, the media, and all forms of communication wherein the culture defines itself. The question of ambiguous advertisements' importance then becomes do they offer meanings repeated across society and what are some of those meanings? Currently there seems to be a trend elevating style and attitude over substance; in other words, there is an emphasis on the surfaces of things and people and the emotional and aesthetic pleasure they provide. As Gitlin (1986) says in discussing certain car commercials and "Miami Vice": "They suggest that the highest destiny of our time is to become cleansed of depth and specificity altogether" (139). The goal for viewers, such messages imply, is to focus on the "correct" look and pose, addressing the reader as "one who knows," who understands and appreciates the emphasis on style over substance. If a reader is at a loss to understand, or desires more substantive meaning, these commercials imply that person lacks both knowledge *and* style. Importantly, this attitude is associated with and defined by things -- clothes, cars, cosmetics and so on. While often not seeming to be selling anything, these ambiguous messages continually point to consumption as the means to gain the correct attitude. Thus, action and change are suggested, but only consumption of the right products and change on an individual basis. The impact of ambiguous advertising, and ambiguous messages across the media, needs careful consideration and research. Given the above introduction to the subject, it seems that these messages may work against a critical, questioning approach to the media and society in general.

References

Barthes, R. (1977). *Image-Music-Text*. (translated by Stephen Heath) NY: Hill and Wang.

Barthes, R. (1974). *S/Z*. (translated by Richard Miller) NY: Hill and Wang.

Bergstrom, J. (1986). Androids and Androgyny. *Camera Obscura 15*, 36-65.

Bogart, L. (1984). *Strategy in Advertising*. Chicago: Crain Books.

Burgoon, M. & Bettinghaus, E. (1980). Persuasive Message Strategies. In M. Roloff & G. Miller (Eds.) *Persuasion* (pp. 141-169). Beverly Hills: Sage.

Chestnut, R. (1980). Persuasive Effects in Marketing. In M. Roloff & G. Miller (Eds.) *Persuasion (pp. 267-283)*. Beverly Hills: Sage.

Edell, J. Staelin, R. (1983). The Information Processing of Pictures in Print Advertisements. *Journal of Consumer Research*. *10*, (1), 45-61.

Ewen, S. (1976). *Captains of Consciousness*. NY: McGraw-Hill.

Gitlin, T. (1986). Car Commercials and "Miami Vice." in T. Gitlin (Ed.) *Watching Television (pp. 136-161)*. NY: Pantheon Books.

Greenwald, A. Leavitt, C. (1984). Audience Involvement in Advertising: Four Levels. *Journal of Consumer Research 11*, (1), 581-592.

Heighton, E. & Cunningham, D. (1984). *Advertising in the Broadcast and Cable Media*. Belmont, CA: Wadsworth.

Krugman, H. (1971). Brain Wave Measures of Media Involvement. *Journal of Advertising Research*, 11, 3-9.

Krugman, H. (1965). The Impact of Television Advertising: Learning Without Involvement. *Public Opinion Quarterly*, 29, 349-356.

Leiss, W., Kline, S., Jhally, S. (1986). *Social Communication in Advertising*. NY: Methuen.

Mandell, M. (1980). *Advertising*. Englewood Cliffs, NJ: Prentice-Hall.

Mills, G. (1964). *Reason in Controversy: An Introduction to General Argumentation*. Boston: Allyn and Bacon.

Morley, D. (1980). *The "Nationwide" Audience: Structure and Decoding*. London: BFI.

Pollock, G. (1977). What's Wrong With Images of Women? *Screen Education*, 24, 25-33.

Silverman, K. (1983). *The Subject of Semiotics*. NY: Oxford University Press.

Sproule, J. (1980). *Argument: Language and Its Influence*. NY: McGraw-Hill.

Weilbacher, W. (1979). *Advertising*. NY: Macmillan.

Williamson, J. (1978). *Decoding Advertisements*. Boston: Marion Boyars.

THE HOLLYWOOD ICON OF THE COWBOY HERO

Joan S. Durden

I. Introduction

To better understand our culture , it is important to evaluate our contemporary icons and to realize the psychological impact that these visual images have on our society in the way we see ourselves and how we interact with others. The Western movie is an American artform which demonstrates the fundamental beliefs of heroism and individuality indicative of the American culture.

This paper will compare and contrast the hero of ancient folklore with the contemporary Hollywood ideal of the American cowboy hero. The ideal of the hero is modeled by the culture's beliefs, either by conforming to the values or by attempting to change the social consciousness of the community. The hero and society have a reciprocal effect on one another, changing the character of each.

The first topic for discussion will be the heroic myth in historical context addressing two models:

1. the archetypical hero of Joseph Campbell's *Hero of a Thousand Faces* (1949)
2. the pragmatic hero as described by Eric Russell Bentley (1944) in his discussion of Thomas Carlyle's essay "Heroes, Hero-Worship and the Heroic in History"(1840).

The next topic will be the development of the cowboy hero motif and some examples of Hollywood's film makers' interpretation of the classic hero in the setting of the American West. Also, the early influences of the western film hero will be discussed. The paper will conclude with the changes in the Hollywood icon of the cowboy hero reflecting events in our history and changes in our social consciousness.

II. Heroic Models

With respect to the heroes of antiquity, we can begin with the universal, the archetypical hero as described by Joseph Campbell. Campbell describes a reoccurring motif of a hero with common characteristics: a person with special and superior qualities of power and understanding. These qualities may have been inherited at birth or received as a gift at a later time. This special person embarks on a journey which is really a search for self knowledge. Danger and peril is encountered, and how this person responds to this threat determines his heroic qualities. Willingness to sacrifice self for the good of humanity, to lose one's ego, to deny the drive for self preservation, and to aspire to noble causes such as saving the vulnerable and the weak are qualities of the noble hero. The trial by ordeal changes the traveler into a hero much like an initiation rite of passage. The journey is a difficult threshold of transformation from common man to hero. Campbell's description of the hero adheres to Christian ideals of love and sacrifice, avoiding violence unless necessary to save another person or to benefit the good of mankind. The hero is mysterious and enigmatic.

The pragmatic hero of Thomas Carlyle does not consider the good of humanity. In fact, Carlyle's hero model is antidemocratic. "The chief tenet of heroes is that great men should rule and that other men should revere them" (Bentley, 1944, p.31). Courage is more valued than love. The hero is a man of action, responding boldly and spontaneously and intuitively without the interference of moral judgement or restrictive codes. He is an individual that stands out from the crowd. The pragmatic hero possesses Hero Vitalism, being bold, decisive and strong, but also can be autocratic and tyrannical. He is a model for other men, a creator of history. Typical Carlylian heroes are Napolean, the emperor who used his military power to unify France and to conquer most of Europe, and Julius Caesar. To Carlyle, the Romans were greater heroes than the Greeks because the Romans were more men of action while the Greeks carefully considered their deeds and thoughtfully reflected on their actions. Carlylian heroism is antidemocratic, anti-Christian, and anti-society in that the individual leader's desires take precedent over societal goals. Much of Carlyle's philosophy is based on Heroic Vitalism which is a strange mixture of Machiavellianism and mysticism, combining the political theory of "might makes right" and the mysticism of the gifted individual blessed with superhuman abilities.

III. Cowboy Heroes of Hollywood

Both heroic models have been used to form cowboy heroes created by Hollywood. The movies create the hero to conform to the ideals and the expectations of the masses. But there are variations in the interpretation of heroic qualities, depending on the content or message of the film and the intention of the director. During the 1950's, when westerns were most popular, variations on both the archetypical, classical hero and of the pragmatic, patriotic hero appear. This was a period of social and political contradictions. The fifties are known for the conformity to collective values and ideals, but there was also a turbulent undercurrent of unrest and of national self examination foretelling the changes to come in the next decade.

George Stevens' "Shane" (1953) represents the archetypical hero who protects the weak from the evil. Shane is like an Arthurian knight with all the characteristics of the hero described by Joseph Campbell: handsome and fair, a mysterious stranger on a journey, a possessor of great skill with the gun, yet he resists the use of violence. He is a noble man caught in an unattainable love relationship with a married woman and sacrifies his hope of "settling down" by a violent shoot-out with Jack Palance, the epitome of evil whose darkness, sharpness, and ruthlessness contrasts Alan Ladd's goodness and fairness. Shane protected the homesteaders from the tyranny of the large ranchers. In doing so, he reveals his violent past as a gunfighter, sacrificing his plan to settle in the peaceful valley. Shane leaves as mysteriously as he arrived.

In Jack Nachbar's *Focus on the Western* (1974), which is a collection of critical analyses of Western films, Michael Marsden writes of "Shane" in his essay "Savior in the Saddle: The Sagebrush Testament". He compares the hero Shane to Christ, having come down from the Grand Teton Mountain, planning to peacefully settle down and hang up his gun. Shane becomes involved with a family of settlers, a father and mother symbolically named Joe and Marion and a little boy Joey who idolizes Shane. Although he has planned to hang up his guns, evil circumstances necessitate his confronting the evil hired guns of the greedy cattle rancher. The settlers' valley is like the "Promised Land", and the evil hired guns are demonic. In the shoot out, Shane is wounded in the left side. Because he has revealed himself as a man with a violent past, Shane must leave the peaceful valley. Before he goes he lays his hand on Joey's head to consecrate him as a follower.

In John Ford's western classic "The Searchers" (1956), John Wayne portrays the cowboy hero, Ethan Edwards. Edwards is a pragmatic hero who is set on a journey of revenge. He leads a searching party to rescue his seven year old neice, who has been taken captive by savage Indians, and to revenge the massacre of the rest of her family. After six or seven years of disappointing search, Ethan Edwards comes upon the elusive Indian group. His plan of rescue changes to one of killing everyone in camp, including his neice. Vengence and family honor take precedent over compassion and love. Knowing Indian customs, Edwards realizes his niece has probably been sexually intimate with her owner brave, since she has reached puberty. He would rather kill her than have her return to the community to disgrace the name of his dead brother. After a violent attack on the Indian village, Edwards scoops up the neice, played by Natlie Wood, to crush her or throw her over the ravine. At the last minute, the memory of his holding her up as a small child prevents the vengeful act.

In Nachbar's *Focus on the Western* (1974), Robert Warshow discusses several westerns of the 1950's in his essay "What is a Western?" He says of "The Ox-Bow Incident", that there was no hero because a hero would have stopped the lynching or would have been killed trying to prevent it. The Henry Fonda character weakly protests by stepping over the line of demarcation, indicating he disagreed with the lynching, but was not brave enough to act on his belief. Warshow credits "The Virginian", "The Gunfighter" and "High Noon" with creating western heroes of a more accurate historical setting. Gary Cooper plays the symbol of "law and order" in "The Virginian", but in "High Noon" Cooper plays an aging marshal caught in a dilemma between hanging up his gun and retiring to a new life with his Quaker bride or facing a duel to end one threat of evil.

According to John Lenihan in *Showdown* (1980), his book on the Hollywood westerns, "High Noon" was an allegory for the contemporary political events of the early 1950's. Carl Foreman, the screenwriter of "High Noon", created this work as a political protest against the fear and complacency of Hollywood which allowed McCarthyism to repress the free expression of film writers, directors, and actors. The setting of 'High Noon" was Hadleyville, a name choosen for its similarity to Hollywood. The marshal had to stand against evil all alone because the townspeople were cowards and conformists. Foreman saw himself as Marshal Kane, standing up to the government bullies with no assistance from the film industry which had buckled under pressure during the McCarthy era. "High Noon" plaintively questioned the values and morality of the complacent 1950's.

John Wayne said " 'High Noon' was the most un-American thing I've ever seen in my whole life. The last thing in the picture is ol' Coop putting the U.S. Marshal's badge under his foot and stepping on it. I will never regret having helped run Foreman out of the country" (Lenihan, 1980, p. 23).

John Wayne acted in many of John Ford's spectacular westerns. He played the tough, decisive, pragmatic hero in such Ford productions as "Stagecoach", "The Searchers", and "She Wore a Yellow Ribbon". He played the kind of hero who survives in a lawless, wild environment. Critics seem to agree that Ford portrayed the west not as it was, but as it should have been. Robert Warshow writes in "The Movie Chronicle: The Western" that John Ford's "Stagecoach" is too preoccupied with cinematic styling: the setting, the horses, and the hero (Nachbar, 1974). He also criticizes Ford's "My Darling Clementine" as being a sentimental and superficial interpretation of history depicting Wyatt Earp as a kind, handsome hero and leader of the community when he was actually a braggart and an imposter.

In the late sixies, the Viet Nam war, the Civil Rights Movement, and the sexual revolution caused Americans to question authority and traditions. Clint Eastwood's cowboy characters in Sergio Leone"s "A Fistful of Dollars", "For a Few Dollars More", and "The Good, the Bad and the Ugly" were anti-heroic, reflecting a society which had lost its innocence. The man with no name is a loner, uncaring and unaffected by the codes of the society. Violence has become his way of life.

Eastwood plays an enigimatic stranger in "High Plains Drifter" (1973). This film was inspired by an event in New York during the early 1970's, in which a young girl, Kitty Genovese, was brutally murdered while neighbors looked away, too frightened to get involved. At the movie's beginning the sheriff in "High Plains Drifter" is bull whipped to death as the townspeople look on, afraid to confront the gang of villainous bullies. Then comes the drifter, played by Eastwood, as an avenging spirit, the Devil, or the reincarnated sheriff. He takes his revenge out on the complacent, cowardly town. He tricks the townspeople into burning the church and painting the town red. The no name drifter writes "Hell" over the name of the town on the sign entering the city. With the bullies killed and the townspeople humiliated, the drifter rides off as mysteriously as he arrived.

IV. Early Influences on the Development of the Cowboy Hero

In general, the mass media (films, television, and advertising) depict their heroic figures as simple, immediate and larger than life. The cowboy hero is the American ideal of individuality, self-confidence and strength. Influences which led to the development of the cowboy hero are as follows:

1. the writings of James Fenimore Cooper's, *Leatherstocking Tales* (1823)
2. the dime novels of the late 19th century which set the formula for the western heroic narratives
3. the Pre-Raphaelite Movement renewal of interest in King Arthur's Knights of Round Table
4. the ever popular heroes of Greek and Roman mythology
5. the West as an exciting, untamed fontier
6. the showmanship of the Buffalo Bill Traveling Western Show, which included costumed pageantry with sharpshooting and riding skills
7. the Saturday matinee which targeted the pre-adolescent audience

The film industry followed a model of the cowboy hero which had been established in the dime novels and early series writers of the late 19th century. Some early dime novels were published in New York, in 1860, by Erastus Beadle, who set about to create publications for mass audiences. The novels were standardized in form and content. The form was guided by a uniform label, packaging and size. The content was inspired by the James Fenimore Cooper's *Leatherstocking Tales*, which were set in the far north eastern territories of the the 18th century. The untamed Northeast of colonial America had characteristics similar to those of the West in the nineteenth century. Leslie Fiedler, in *The Return of the Vanishing American* (1968), distinguishes J. F. Cooper as the writer who created our basic myths of American pioneer life, individuality, and freedom. These tales became the model for later writers. The premise of the *Leatherstocking Tales* is the juxtaposition of civilization with a savage wilderness, men and vulnerable women caught in the lawless fontier of backwoods with the constant threat of Indian savagery. Cooper's heroes of Hawkeye and Natty Bumpo provide the model for the cowboy hero, being close to nature, confident and capable, but reserved and distant in establishing a man/woman relationship.

One of Beadle's writers, Edward Wheeler, in 1880 created the cowboy hero Deadwood Dick who possessed all the attributes of an American hero courageous, virile, and indivualistic, but born to common and unprentious rank. Deadwood Dick was somewhat like a Daniel Boone or Davey Crockett, but experiencing adventures set in the Dakota Hills rather than Kentucky or Tennessee. Deadwood Dick served as a model for later "B" Film cowboy heroes who were brave and skilled, yet chivalrous and true; truly an idealized hero.

According to Kathryn C. Esselman, in her essay "From Camelot to Monument Valley: Dramatic Origins of the Western Film", which is included in Nachbar's (1974) collection of critical analyses of western film, an earlier influence in the formulation of the cowboy hero is the stage melodrama, "Nick of the Woods", written by Robert Montgomery Bird in 1837. This narrative recounts the story of a peace-loving Pennsylvania Quaker set on a path of revenge for the Indian massacre of his family. The resulting "Jekyll-Hyde" character set out on secret night attacks to kill every Indian he encountered. This story was the basis for John Ford's classic film "The Searchers" (1956).

The American West provided the setting for heroic narratives. It was an unknown, uncivilized land, subject to natural catastrophies and clashes with savage Indians and lawless bandits. The western narratives were a natural product of the Easterner's desire to know more about the vast frontier, and the West had all the necessary ingredients for good story telling. The westward movement was more than a historic period in American history. The west was fertile ground for myths and legends, the struggle of good and evil with heroes and passion and death. According to Richard Maynard (1974), it was the re-elaboration of the Olympian world, a synthesis of Hellenic thought and Yankee dynamism. The cowboy on horseback was the new centaur.

The early writers of western adventures adhered to a formulaic plot which was created by writers of Beadle's pulp publishing and aimed at mass audiences for light reading entertainment. The plot was based on a clash between wilderness and civilization on the frontier, inspired from Cooper's earlier writings. The formulaic plot was continued because readers came to expect it. John Cawelti (1978), a literary and film critic, attributes the popularity of the Western to the familiar and formulaic plot, setting and characters; the mass audience can follow the simple format and appreciate the subtle variations. The western genre expanded the clash of civilized cowboy against savage Indians to include more sophisticated conflicts with unscrupulous ranchers or greedy bankers, with the hero resolving the conflict in a sequence of fighting, chasing, and arresting the villains.

The first film cowboy heroes, such as Bronco Billy and Tom Mix, were influenced by Buffalo Bill's Traveling Wild West Show. They were non-violent men promoting goodness and decency through their visual appearance, neatly dressed in light values, tastefully ornamented. The good guys were aesthetically orchestrated to symbolize the noble hero. They were expert sharpshooters and horsemen, two qualities highly valued in American folklore. The iconography of the western hero included his horse and his gun. The horse was not only transportation but a friend and an extension of the hero's persona. The closeness of the cowboy hero and his stead created a modern centaur or an American knight. The love of Arthurian literature had been revitalized in the 19th century with the Pre-Raphaelite movement. The worn heroics of the Knights of the Round Table were modernized and revitalized with the setting of the new frontier.The six-gun was a symbol of power and independence, a means of survival in a lawless land. In Buffalo Bill's Traveling Rodeo, the gun was a tool of skill, not of violence. The heroes of early Westerns seldom shot to kill but more often used their superior shooting skills to knock the gun out of the villain's hand.

The hero's relationship with women was reserved and usually unfulfilled. The women were unattainable, as was the wife of the settler in "Shane", or were unmarriageable for moral reasons based on their tainted background, usually being or having been a prostitute or a dance hall girl. Another formulaic heroine is the Eastern educated woman arriving west to become the school marm. A union of the hero and such a woman reinforces the American ideal of the the union of knowledge and strength, of civilizing the frontier. When the narrative ends by joining the hero with the spirited rancher's daughter, such a union reinforces the ideals of American entrepreneurship and physical durability (Lenihan, 1980).

One of the earliest Hollywood cowboy heroes was William S. Hart. Hart starred in "Tumbleweed" (1925) as a cowboy free to roam the open range. As homesteaders move west, the land becomes restrained by fenced barriers. The cowboy relinquishes his freedom by marrying a girl and settling down. In "Tumbleweed", the Hart hero sacrifices his personal freedom for the collective welfare and progress of civilization (Lenihan, 1980). The final visual is of the tumbleweed, which has been a symbol of personal mobility and freedom throughout the film, impaled on a barbed-wire fence. This metaphorical analogy addresses the theme of individual freedom constrained by the civilizing of the frontier. William S. Hart's early silent films became outdated because of the overacting and sentimentality which lost its appeal with advanced technology and the introduction of sound as an element of film making.

The Cowboy heroes of the "B" Westerns of the late thirties and the forties were simplified characters patterned for the immature audiences of the Saturday matinees. Gene Autry and Roy Rogers were two of the superheroes of the Saturday matinee. Other leading cowboys were Hopalong Cassidy, Johnny Mack Brown, the Lone Ranger, and Lash LaRue. These uncomplicated heroes are like chivalrous knights dressed in costume, riding their personified steeds, taking cues from Buffalo Bill's Wild West Show for pageantry and trick shooting. The typical plot clearly defined the good and the bad. Bad characters were often bankers or large ranchers greedily grabbing the small man's land. This plot reflects society's negative reaction to the banks' foreclosures of the depression era. Another interpretation of the evil banker in Saturday westerns is that the immature audiences associated the banker with the adult world which has economic and physical power over children. The pre-adolescent internalizes the qualities of the hero and, through fantasy, experiences victory and control over the adult world, thus venting his frustration with his powerless circumstance. The Saturday afternoon Westerns were simple in plot, characterized by posse chases, run away stagecoaches, saloon fist fights and main street shoot outs. This is pure action adventure with an uncomplicated plot and no need of thoughtful reflection. The emphasis on action allowed immature audiences to vent their energies in a positive way. The simplicity of the Saturday Western had run its gamit after ten years and could not compete with the advent of television. Several Hollywood matinee cowboy heroes shifted successfully from movies to the television medium, i.e. Roy Rogers and Hopalong Cassidy.

V. Heroic Qualities Reflect Political and Social Changes

After World War II, Western films continued in appeal, and the fifties saw the height of their popularity. Some western heroes reasserted the patriotism and the conformity of the 1950's such as John Wayne, Randolph Scott, and Audie Murphy. Others reflected the fifties as a time of self examination of American domestic and foreign policies, such as Marshal Kane of "High Noon" and the vigilantes in "The Ox Bow Incident". The heroes of the westerns of the sixties such as Rooster Cogburn and Eastwood's No Name were hardened by global conflicts, a loss of innocence, and a disregard for authority and establishment. The heroes of the seventies were anti-establishment. Some unlikely heroes aligned themselves with the natives against civilization to show the serenity of the Indians' philosophy of life with nature; such heroes were Little Big Man, Jeremiah Johnson and Horse. In "McCabe and Mrs. Miller"(1971), the anti-establishment hero McCabe, a novice entrepreuner in the prostitution business, stood up to the threat of a large monopolistic mining company and was killed. There have been very few westerns produced in the 1980's; although, Eastwood has continued variations of his No Name iconoclastic hero in the "Pale Rider" and the "Dirty Harry" movies. Then there was "Silverado", a nostalgic reminder of the good old westerns of the 1950's. Perhaps the mini-series "Lonesome Dove" will regenerate the public demand for more adult westerns.

In *The Return of the Vanishing American* (1968), Leslie Fiedler points out a parallel of fear which spans three hundred years in America. The fear the early settlers experienced in seeing or imagining shadowy figures lurking behind trees in the the colonial forests is being relived by commuters in the subways of the Lower East Side of New York City. The threat is instigated by very different reasons and conditions. The Indians creating colonialists' fear were protecting their land from intruders. The subway savages of the commuters' fears are the drug addicts and sociopaths depending on others to provide for their needs. Since Fiedler made this poignant comparison in 1968, current events and later Hollywood films suggest his statement to be prophetic. American myths and Hollywood heroes have been inspired by both threats. The cowboy hero of frontier days evolved from the Indian conflict. A more recent hero is emerging from the latter threat. The urban vigilante or protector straps on a gun to right the wrongs that institutional forces cannot seem to solve. These secret avengers take their cues from R.M. Bird's "Nick of the Woods", being law abiding citizens in the day and revenge seekers by night. Hollywood made a successful film, "Death Wish", and its sequel, "Death Wish II", in which the hero avenges his wife's murder and his daughter's rape by riding the subway at night looking for villains, whom he summarily kills. We usually think of the film industry drawing from life, but here is an example of life reflecting a film narrative. After "Death Wish" I and II were successfully received, an incident on the New York subway at Canal Street recalled the image of a unlikely urban cowboy hero. An anonymous rider answered the threat of three muggers with a round of gun fire and slipped into the crowd unidentified. New Yorkers applauded his action and the muggings decreased. After a while Bernard Goetz turned himself in and was convicted of carrying a concealed weapon. I do not mean to imply there was a conscious imitation of "Death Wish" when Goetz strapped on his gun. His action was prompted out of frustration with the law and order system in regards to a previous mugging which Goetz experienced. To many people Bernard Goetz is a contemporary hero, and the event cameos a problem with our system of justice in which the rights of victims are not protected. With the fear and violence that exists today, one might wonder if civilization has indeed overcome the wilderness.

Bibliography

Bentley, Eric Russell. *A Century of Hero-Worship, A Study of the Idea of Heroism in Carlyle and Nietzche*. Philadelphia: J. B. Lippincott Company, 1944.

Bold, Christine. *Selling the Wild West*. Bloomington, Indianapolois: Indiana University Press, 1987.

Campbell, Joseph. *The Hero with a Thousand Faces*. Princeton, New Jersey; Princeton Press, 1949.

Cawelti, John G. *The Six-Gun Mystique*. Bowling Green, Ohio: Bowling Green University Popular Press, 1978.

Fenin, George N. and Everson, William K. *The Western*. New York: Grossman Publishers, 1973.

Fiedler, Leslie A. *The Return of the Vanishing American*. New York: Stein and Day Publishers, 1968.

French, Philip. *Westerns*. New York: Oxford University Press, 1977.

Nachbar, Jack. *Focus on the Western* . Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1974.

Lenihan, John H. *Showdown*. Chicago, Illinois: University of Illinois Press, 1980.

Maynard, Richard A. *The American West on Film: Myth and Reality*. Rochelle Park, New Jersey: Hayden Book Company, Inc., 1974.

Tuska, Jon. *The American West in Film*. Westport, Connecticut: Greenwood Press, 1985.

FROM CUBISM TO HOLOGRAPHY

Hilary McLellan

Introduction

Cubist paintings, portraying a still life or the human face and form from multiple points of view, presaged holograms which incorporate two related images of the same object so that it is possible to go back and forth between the two perspectives. The ability to look at, synthesize, and evaluate things from different but highly interrelated points of view is a cluster of the most important literacies we will need in the Information Age. Thus the hologram can serve as a symbol of present day interactive technologies and the cognitive skills they promote. An earlier age of revolutionary technological change, the Renaissance, invented linear perspective, together with the printing press.

Today, in the Information Age, interactive electronic media such as the computer, videodisc, CD-ROM, and hypermedia provide ready access to different perspectives or points of view. We are coming around again full circle from the pattern of print dominance launched during the Renaissance: our literacies again match more fully the multimodal nature of human perception. In particular, visual communication is vitally important in the Information Age. This is a return to an earlier time, but also a revolutionary departure. Mary Alice White (1987) points out that "For 10,000 years, humans learned from images and from speech. For the last 500 years, humans have learned primarily from print."

With electronic media, it is possible to examine different "perspectives" in several ways. First, it is possible to simulate different courses of action and explore the possible ramifications of different options. Similarly, it is possible to view a situation from the unique points of view of different characters or entities involved; for example, the points of view of the two superpowers as well as other countries in a simulation on international diplomacy or international financial planning. Electronic media provide not only different viewpoints, but also different kinds of descriptions, using different symbol systems, depending on purpose. It is possible to shift between symbol systems, from text, to numbers, to pictures, to graphics. Electronic media also make it possible to view things that might otherwise be too small or too large or too far away for us to see clearly otherwise. With hypertext and related resources, it is possible to explore multiple levels of information, to branch off onto sidelines, exploring contextual information flexibly and in depth, as desired, before returning to the point of detour. Unlike print with its fundamentally linear structure, the structure of the new technologies is still under design, linked to an exploration of the structure and operation of the human mind so that it will be as "user friendly" as possible. This paper will examine the nonlinear, exploratory, multimodal perspectives offered by interactive electronic media and how this can be used to promote learning and critical thinking.

First let us examine both cubism and holography in greater depth. This will establish a foundation for the author's ideas about electronic technologies and their power as tools for thinking and learning.

Cubism

Right before World War I, in the early years of the twentieth century, two artists, George Braque and Pablo Picasso, explored a new direction in art that we know as Cubism. Cubism took familiar and simple subject matter, broke it up, looked at it from several directions at once, and finally reintegrated it in ways that compell the viewer to see things differently (Russell, 1989).

As a result of that reintegration, everyday forms of all sorts can be read in any number of ways. "When the pioneer cubists were all done with a guitar, it was recognizably first cousin to a woman. A strip of wallpaper, pasted on to canvas, turned into a perfectly tailored shirt (Russell, 1989)." One analyst has suggested that some Cubist paintings give one a feeling of reading a book without turning its pages (Schmeller, n.d.). In Cubist paintings, the characteristic prismatic and pyramidal forms are not heavily and weightily at rest like the stones of an edifice, but are set in motion, dynamic.

Picasso and Braque began expressing "the leap from linear space into multiple perspectives as early as 1914." (Berner, 1980, p. 2) In their work at this time, we see an object or a group of objects from a number of sides, from the top and the bottom, all in the same image. Central perspective is systematically destroyed. The observer is no longer nailed to the spot as in traditional perspective drawing, with the vanishing point out on the horizon. In a major shift of expression, the viewer becomes one moving vanishing point, and the other shifting infinity is found in the picture (Berner, p.2).

The "new way of looking" put forward by the cubists coincided with other "new ways of looking" in physics and other fields. For example, in physics, Einstein demonstrated that light behaves as both waves and particles. Scientists have also found that visible light is actually only a very narrow portion of the electromagnetic spectrum, which ranges from very low frequency radio waves, to the ultra-short high-frequency gamma rays and cosmic rays (Berner, p.2).

Visible light is what allows us to see the world: our eyes are finely tuned to this range, and only through specialized instrumentation can we "read" other frequencies of light such as infrared and X rays. Visible light contains many frequencies (colors) and intensities, and comes from many directions. It is described as "incoherent" light because its beams spread out after a short distance, becoming wider and less intense with increasing distance. If this were not true, light from the sun or other stars would overwhelm us, similar to the child who starts a fire by focusing sunlight through a lens. Even if a beam of this visible light is filtered so that it is monochromatic, it will still be incoherent, since its waves are not in phase with one another (Berner, p. 6).

A beam of photons (the 'light particles" of quantum theory) that have the same frequency, phase, and direction is said to be coherent light. Only such a coherent beam of light will not spread out and diffuse over short distances. Coherent light, consisting of just one frequency and amplitude, does not occur anywhere in nature. Such pure light was first seen when a working laser was built in 1960. LASER is an acronym for Light Amplification by Stimulated Emission of Radiation. The discovery of the laser set the stage for the development of holography (Berner, pp. 6-7).

Holography

The possibility of producing a three-dimensional image or hologram of an object using a light sensitive (photographic) plate and a powerful, coherent light source was actually first discovered in 1948 by a Hungarian born scientist working in Scotland. Gabor made his first holograms using a filtered mercury lamp as a light source, but the images were blurred and dim. It was only in 1960, with the development of the laser, that a sufficiently strong, coherent light source became available to really make a hologram. Gabor won the Nobel prize for his discovery in 1972.

The word *hologram* comes from the Greek words "*holos*," meaning "*whole*," and "*gram*," meaning "*message*." Thus holography means "the whole message." A hologram contains all the information about the object it has recorded, including shape, contour, and position. If a hologram of a sculpture is made, and the hologram is cut in half, each piece still contains the full, three-dimensional image of the sculpture. Cut each of the two two pieces in half again, and all four will still contain "the whole message," although each from a slightly different angle.

A hologram is a recording of the pattern of light waves as they are reflected from an object. This pattern is recorded on a photographic plate and when a light is shone on this plate, it reflects those light waves back and recreates the original object as a three dimensional image (literally as points of light focused in space). Holography is a special photographic technique in which lasers are used to record highly realistic images of three dimensional objects. The photographic record is called a hologram. Holographic images have all the same physical qualities as the real objects from which they are taken except that they cannot be touched. For example, a hologram of a diamond or precious stone has all the visual properties of a real gem, reflecting light from all its facets (A.H. Prismatic, n.d.). Holography makes it possible to obtain a three-dimensional representation of an object just as linear perspective introduced accurate depth representation during the Renaissance. Holographic images display all of the characteristics of three-dimensional objects, such as change of perspective with the position of the observer (Berner, 1980).

A beam of light from a laser differs from light emitted by ordinary sources-for example, a light bulb-in two ways. First, it is monochromatic; the light waves in it are all of the same wavelength. Second, it is coherent; the crest and trough of each wave are in step with the crest and trough of every other wave. Ifone thinks of a beam of light as consisting of a succession of wavefronts, then a beam of laser light is one in which all points of the wavefront are related in phase (Berner, 1980). When two coherent wavefronts are superposed (that is, when two coherent beams intersect), they produce the phenomenon of interference: The wavefronts augment each other if they are in phase, and they diminish each other if they are out of phase. The interference phenomenon is what makes holography possible (Berner, 1980).

Holography has shown great promise as a tool in many fields of science and engineering. For example, with holography, it is possible to record a three-dimensional object and then study it at leisure; this can allieviate some of the problems associated with viewing objects under high magnification (Berner, 1980). Holography has also proven useful in interferometry, the technique of using interference to make extremely precise measurements. Several holographic techniques have evolved that are capable of displaying the reconstruction of an object together with a wavefront from the same object after it has experienced some type of distortion-in particular, distortion that is too fine to be detected by other means (Berner, 1980). Holographic techniques have also been applied in several other areas of optics. For example, special purpose holograms are used to perform recognition of features in aerial photographs.

The stage is now set for considering the multiple points of view made available by electronic media. The work of the Cubists and Dennis Gabor's invention of the hologram before it was really technically possible, together with discoveries in physics and other fields illuminate a fundamental characteristic of the Information Age: in an increasingly complex and interrelated world, we need to be able to look at things from multiple perspectives in order to more fully understand them.

Simulation

With electronic media, it is possible to simulate different courses of action and explore the possible ramifications of different options. Computer simulationsencourage trial and error. Mistakes made on the computer cost little in money and lives compared with the potential costs of real experiments. For example, a computer model of an automobile can be "driven" into a computer model of a brick wall so that engineers can observe the effect of the crash on computer-model passengers and improve the car's design. Similarly, a computer simulation can reveal the pressures on the wings and tail of a jet "flying" at high speeds.

Another application comes from the field of architectural engineering. Information about floor plans, engineering specifications and interior designs can be assembled into a computer database, and from this, architects and engineers can create a number of highly elaborate models. For example, engineers can use programs that translate information about building materials and load bearing capabilities into overlapping images that demonstrate the effect of an earthquake on a building's structural integrity.

Similarly, it is possible to view a situation from the unique points of view of different characters or entities involved, for example, the points of view of the two superpowers as well as other countries in a simulation on international diplomacy or international financial planning. Videodisc-based training programs offer simulations of situations that may be encountered by lawyers, sales representatives or psychologists, providing learners with problem solving experience in different situations they will encounter on the job by letting learners exploring different strategies, the roles of different participants, and even different personality types that may be a factor. We will pick up this theme again at a later point.

Shifting between symbol systems

Another area where computers are proving extremely valuable is in translating information between symbol systems, from text, to numbers, to pictures, to graphics. In particular, the translation between numbers and graphics or pictures is proving vitally important in the age of supercomputers.

Researchers are finding that with computer-generated pictures, they can easily recognize hidden patterns that could never be found in the huge columns of numbers that have been the basis for scientific research in the past. Scientists have traditionally used illustrations and charts to display their findings, but the complexity of modern scientific problems and the realms of data generated by supercomputers have made the graphic representation of data all the more vital (Markoff, 1988).

Heinz-Karl Winkler, a physicist at Los Alamos National Laboratory, explains: "The human brain is the best pattern recognizer in history. We can use it to visually scan vast quantities of data. We can zero in on a structure in an image and distinguish between important things and unimportant things" (Quoted in Markoff, p. 1).

Scientists now rely more and more on computer graphics to help them visualize data rather than pore over vast arrays of numbers. In the face of complex problem solving such as those made possible with supercomputers, it appears that scientists have a much easier time getting an intuition from pictures than they do from numbers and tables of formulas. In most physics experiments, the answer used to just one number or a string of numbers. In the last few years the answer has increasingly become a picture. Computers provide the necessary graphic tools to support this kind of picture. Using supercomputers, scientists can convert numbers into images that appear as two- or three-dimensional color pictures or movies on computer screens (Markoff, 1988).

One example of the translation of numbers into dynamic computer graphics can be seen in a supercomputer program that models how a tornado forms in a thunderstorm racing across a prairie. "This is a highly complex scientific problem, requiring dozens of separate mathematical equations. Solving the equations would would create an answer requiring millions or billions of numbers. Today researchers are using pictures and movies to dramatically simplify their answers and to give new insights into the formation of tornadoes (Markoff, 1988)."

The need to "see" the numerical output from a powerful supercomputer has had a far-reaching impact, creating a new style of computing. Images, and frequently images that are animated, have quickly become the standard fare of the supercomputer world. Scientists report that the use of images instead of numbers has produced a fundamental change in the way researchers think and work. To permit scientists to continue to focus primarily on science, the National Center for Supercomputing Applications has created interdisciplinary groups it calls "renaissance teams," an approach to research that unites the scientist with a graphic artist and a computer programmer to solve a problem. As a member of such a team, the graphic artist brings traditional artists' tools, such as shading and color, to bear on the oceans of numbers that spew from supercomputers. The artist also brings to the team an artistic intuition and creative expression that is unprecedented in the realm of scientific exploration (Markoff, 1988).

Another example of the important role computer graphics can play in scientific research is shown in a three-dimensional graph representing the complex relationship between the amount of ozone in the atmosphere, the latitude and the time of year. The advantages of presenting such information in a quickly grasped visual form have made graphs and charts one of the fastest-growing segments of the computer graphics industry (Time-Life).

An example of how this translation between symbol systems can be applied to learning can be seen in graphic programs designed to increase the effectiveness of speech therapy. Such programs use a microphone to accept learners' speech sounds and then digitizes, stores and instantly analyzes these sounds, while providing immediate feedback. Animated displays refine and simplify the feedback process by making selected attributes of speech (such as pitch, loudness and timing) visible and easy to comprehend. These programs utilize the computer's graphics feedback capabilities and interactive, gamelike strategies to stimulate and maintain learners' interest, while making abstract acoustic concepts simple and understandable. This is but one of many examples. Dickson (1985) suggests that computer programs that encourage users to go back and forth between two or more sysmbol systems are likely to promote thinking skills and understanding.

Different points of view

Electronic media also make it possible to view things that might otherwise be too small or too large or too far away for us to see clearly otherwise. Computer imagery reveals the invisible. Biologists and chemists employ computer graphics to simulate the invisible behavior of molecules and atoms.

In the field of medicine, NMR and PET scanners, using computer graphics, permit doctors to look inside the body to diagnose diseases with a degree of confidence never before possible. A medical graphics program helps a surgeon plan an operation on a displaced hip. After calling up a three-dimensional image of the pelvic bones, constructed from two dimensional CT scans, the surgeon can examine both the healthy hip joint and the displaced hip in windows on the computer screen before designing a prosthetic hip joint (Time-Life, p. 106).

Researchers in other fields make use of computers to study abstract ideas that defy verbal description. An example of this is the so-called fourth dimension. In his Theory of Relativity, Albert Einstein considered time to be a fourth dimension. According to Einstein, an object is defined by its height, width and depth, with time as a fourth measure. Recently, some theoreticians have speculated about a fourth spatial dimension, that is no different in character from the other three. Mathematicians can define hypothetical objects in higher dimensions with complex equations, but it is difficult for inhabitants of a three dimensional world to visualize them. A computer has none of the usual human preconceptions so that given the right numbers and a sophisticated program, it can easily illustrate four- dimensional analogues of three-dimensional objects (Time-Life).

Multiple levels of information

Hypertext and related resources make it possible to branch off onto sidelines, exploring contextual information flexibly and in depth, as desired, before returning to the point of detour. Hypermedia, combining the computer with other resources such as videodisc and CD-ROM, makes it possible to access related information in many forms: text, pictures, motion sequences. It avoids the traditional beginning, middle and end of normal writing, and leads to a more associative development of ideas. The nonlinear character of hypertext extends thought processes beyond the sequential and linear processes of normal chapter-by-chapter books to facilitate the exploration of associational linkages. The designer of a hypertext resource must take into account the independent will of the audience.

Howard Rheingold (1985) envisions the computer as a vehicle for navigating "information space." Rheingold proposes: "Imagine that you are in a new kind of vehicle with virtually unlimited range in both space and time. In this vehicle is a magic window that enables you to choose from a very large range of possible views and to rapidly filter a vast field of possibilities - from the microscopic to the galactic, from a certain word in a certain book in a certain library to a summary of an entire field of knowledge (p. 109)" This territory "is not the normal landscape of plains and trees and oceans, but an informationscape(p. 109)." The features consist of words, numbers, graphs, images, concepts, paragraphs, arguments, relationships, formulas, diagrams, proofs, bodies of literature, and schools of criticism. The computer vehicle provides a catalyst for fundamentally changing our old ways of organizing information. This new information space is a system modeled on the way the human mind processes information. It is fascinating to compare Rheingold's vision of information space with the notion of Cubist paintings as books that could be read without turning their pages.

Learning and critical thinking with interactive media

Bruner (1986) has put forward a bimodal model of storytelling. He suggests that we have two modes of storytelling, paradigmatic and narrative (another way of talking about the two modes of thinking). Paradigmatic storytelling involves "good theory, tight analysis, logical proof, and empirical discovery." Narrative storytelling involves "good stories, gripping dramas, believable historical accounts." Narrative storytelling emphasizes more pattern-oriented, artistic skills, whereas paradigmatic storytelling emphasizes more language-driven analytical qualities. I propose that interactive electronic media can help provide learners with a bridge between paradigmatic and narrative modes of storytelling, thereby enhancing contextual understanding and the meaningfulness of the information encountered. One exciting example of how interactive media can bridge back and forth between the two modes of learning comes from the work of John Bransford and his colleagues at Vanderbilt University. These researchers are exploring the capabilities of computer- controlled videodiscs. Using movies such as ***Raiders of the Lost Ark*** on videodisc, Bransford pulls the paradigmatic mode of storytelling out of the narrative story of the movie. Bransford sets up problems based on incidents in the movie that illuminate scientific principles. For example, in one scene in ***Raiders***, Indiana Jones replaces a statue that appears to be solid gold with a bag full of sand; he wants the statue, but without something in its place, a dangerous reaction will be triggered. Learners are provided with information about the weight of gold, which is very heavy. From this, they can perceive that the gold statue would be extremely heavy; Indiana Jones could only lift it with great difficulty and the sand would not compensate for the weight of the gold. Research has shown that using the movie example makes the information more vivid and improves students' ability to remember weights of different materials. Recently the researchers at Vanderbilt have produced their own videodisc program, ***The Adventures of Jasper Woodbury: The First Episode*** which tells a narrative story that is embedded with "data" for paradigmatic storytelling that builds mathema- tical problem solving skills in students fourth grade and up.

Another feature of storytelling with interactive computer tools is that it is nonlinear. The computer's nonlinearity fundamentally changes the idea of the story as something fixed, with beginning, middle and end predetermined. With the computer, it is possible to explore different sequences of events and outcomes. This may have extremely valuable potential, given what is known about experts' thinking (Resnick, 1985). Recent research in science problem solving shows that, in contrast to novice problem solvers who are attempting to pursue a straightforward linear path toward a problem solution, experts "dance" around a problem looking at it from many different vantage points. The experts do not respond to problems as they are presented. Instead, they reinterpret the problems, recsting them in terms of general scientific principles until the solutions become almost self-evident.

According to Lauren Resnick (1985), some of the key features of higher order thinking include the following:

1) Higher order thinking is non-algorithmic. That is, the path of action is not fully specified in advance.
2) Higher order thinking tends to be complex. The total path is not "visible" (mentally speaking) from any single vantage point.
3) Higher order thinking often yields multiple solutions, each with costs and benefits, rather than unique solutions.
4) Higher order thinking involves nuanced judgment and interpretation.

5) Higher order thinking involves the application of multiple criteria, which sometimes conflict with one another.
6) Higher order thinking often involves uncertainty. Not everything is known that bears on the task at hand.
7) Higher order thinking involves self-regulation of the thinking process. We do not recognize higher order thinking in an individual when someone else "calls the plays" at every step.
8) Higher order thinking involves imposing meaning, finding structure in apparent disorder.
9) Higher order thinking is effortful. There is considerable mental work involved in the kinds of elaborations and judgments that are required.

Several of these characteristics of higher order thinking put forward by Resnick reaffirm all the more the importance of looking at the world from multiple points of view in order to optimize problem solving and effective thinking. I believe that technology, used as a tool for learning and problem solving, can enhance these higher level skills by providing powerful yet flexible access to multiple points of view.

References

A.H. Prismatic Ltd. (No date). Holography: A brief introduction. Brochure.

Berner, J. (1980). The Holography Book. New York:Avon.

Bransford, J., Sherwood, R., and Hasselbring, T. (1988) The Video Revolution and its Effects on Development. In: Forman, G., and Pufall, P. B., Constructivism in the Computer Age. Hillsdale, NJ: Lawrence Erlbaum Associates.

Bruner, J. (1986). Actual Minds, Possible Worlds. Cambridge, MA: Harvard University Press.

Computer Images. (1986). Editors of Time-Life Books, Alexandria, VA.

Dickson, W. P. (1985, May). Thought Provoking Software: Juxtaposing Symbol Systems. Educational Researcher.

Markoff, J. (1988, October 31). Supercomputer Pictures Solve the Once Insolvable. New York Times. Section 1: 1 and 26.

Rheingold, H. (1985). Tools for Thought. NY: Simon and Schuster.

Resnick, L. (1986). Education and learning to think. Report prepared for the Commission on Behavioral and Social Sciences Education, National Research Council.

Russell, J. (September 17, 1989). Two Who Made a Revolution. The New York Times. Section 2: 1 and 37.

Schmeller, A. (No date). Cubism. New York: Crown Publishers, Inc.

White, M. A. (1987). Information and Imagery Education. In: What Curriculum for the Information Age? Hillsdale, NJ: Lawrence Erlbaum Associates.

CINEMATIC THINKING IN THE AGE OF COMPUTING

Roger B. Wyatt

INTRODUCTION:

Electronic imagery, the merging of computing, video, film, and other imaging systems is dependent upon a complex web of aesthetic, technical, historical, and philosophical ideas. The focus of this paper will be on the dialog of aesthetic ideas that are the foundation of electronic imagery and their implications for the visualization of information and knowledge, in all its forms, in a post-industrial society. It is the author's intent to utilize these concepts as probes, in the McLuhan sense of the term, eventually building towards an aesthetic of information.

IDEAS DRIVE TECHNOLOGY WHICH IN TURN DRIVES IDEAS:

Technological progress is dependent upon a conversation of ideas. Ideas speak to each other. From their interaction, new contexts for development are created. Emerging from the resonating intervals between diverse thoughts, new conceptions of technology arise. These new conceptions generate new ideas, which in turn become the ground for a new stage of technological development. In order to gain a global understanding, no human artifact, including ideas or technology, should be considered out of context.

Change is an inevitable attribute of technology development. However change isn't uniform and comes in many forms. In the first stage of technological development, two divergent modes of conceptualization arise. Both cause change.

One conception is to utilize the emerging technology to do what is already being done, but to do it better. This is secondary change. Secondary change thinking extends the present indefinitely into the future. The other mode is to conceive of new realities, things that have never been done but are now possible because of new technology. This is primary change. Primary change thinking extends the future completely into the present. Though different, both forms of change are powerful. They alter not only what and how we do, but why we do it. They are the engines of development.

REGARDING AESTHETICS AND TECHNOLOGY:

With primary change, the conceiving of new realities, intellectual vision is out ahead of hardware reality. As Peter Galassi has observed, in Before Photography, it is often the case that for an aesthetic form to develop, new technologies must be created in order to facilitate new advances in aesthetic thinking. Ideas generate hardware.

Galassi relates the aesthetic evolvement of landscape painting with the development and subsequent utilization of photography. The development of a naturalistic aesthetic, with emphasis on "the mundane, the fragmentary, the seemingly uncomposed" (Gallassi, p. 28), an attitude which encompasses so much of the aesthetics of early photography, was already in place before photography was invented. It was being worked out in the landscape painting of the end of the eighteenth and beginning of the nineteenth centuries.

Thus it is with electronic imagery, a visual form with roots in animation, simulation, motion picture special effects, interactivity, collage, digital video effects, and experimental film. Its development is a technological response to an aesthetic imperative. Considered in this context, "The Persistence of Memory" (1931) by Dali is a prototypical digital video effect.

An example of this is found in the progression of aesthetic developments in abstract animation from the works of Oskar Fischinger (MOTION PAINTING #1, 1947) in the twenties, thirties, and forties to the works of John and James Whitney (LAPIS, 1968) in the fifties and sixties. Fischinger's exquisite abstract single framed animations of complex paintings created a brush stroke at a time on glass, anticipate the the intricate geometrical visions of the Whitneys' IBM-sponsored pioneering computer animations of the following decades. The Whitneys knew Fischinger's work through their intensive involvement in the West Coast independent film movement of which Fischinger was a prominent member. Through the careers of these animators, the German avant garde of the Twenties is directly linked to the IBM computer research efforts of the fifties and sixties.

Both "Motion Painting #1" and "Lapis" are dense and complex visual abstractions. Fischinger had created computer animation without the computer. He had pushed to the limit what could be accomplished by hand in the realm of abstract animated imagery. Computer animation technology was required in order for this animated aesthetic to progress onward to the visions of the Whitneys. The invention of new technology was required in order for this aesthetic to grow and become complex.

THE COLLAPSE OF CINEMATIC LANGUAGE:

As a result of primary change, in both hardware and thought (wetware), the classical language of cinema is approaching its limits of usefulness. The cinematic theories of Eisenstein, Vorkoich, Basin, and Hitchcock --- with Hegelian resonances --- cannot account for metamorphasis, a major technique of the emerging aesthetic of electronic imagery. To speak of these complex images in the context of long shot, medium shot, close-up, parallel action, and all the rest misses so much. To say special effect is to say so little.

BEYOND NARRATIVE, TOWARDS ABSTRACTION, INTO PICASSOLAND:

In the second stage of technology development, new aesthetic ideas are developed in response to the new hardware reality. Thus DVE (Digital Video Effects), will facilitate the increasing tendency toward abstraction, away from narrative in film and video.

Narrative theater has been the primary influence on film since its early development. This will change as a result of the general trend of embedding computers in video hardware. Already MTV, The Pee-Wee Herrmann Show, and Miami Vice are indicators of this trend.

New visions require new articulation. New articulation requires a new language. Accordingly, new cinematic language is required to examine new cinematic ideas. This in turn extends the conversation of ideas that surround cinematic thinking in the age of computing.

Reference:

Galassi, P. (1981). Before Photography. New York: The Museum of Modern Art.

THE SHAMANIC JOURNEY: DIRECT ACCESS TO THE MUSE

Thomas R Lightfoot

For twenty thousand years or more, shamans all over the world have sought to enter altered states of consciousness using various methods. This experience gives shamans insight about the concerns of their society. They obtain sage advice about both personal and societal problems, they have prophetic visions, and they obtain the knowledge necessary to devise healing treatments for the physically and emotionally ill. The strange visions they have on these "journeys" in the mind, with bizarre creatures, surreal landscapes, and apparitions of the dead, seem to penetrate a spirit world unknown to the average person. It is believed that the shaman's unusual knowledge comes directly from these spirits or even the creator. The shaman's ability to move between these two worlds, that of everyday reality and the spirit world, helps to establish, maintain, and restore balance to their communities. This balance integrates physical, psychological, and spiritual well being through an understanding of the unity of existence.

With the current problems and lack of balance facing us in the world today we would do well to look at shamanism as a guide in our efforts to bring ourselves and the world back into balance. The magnitude of the problems that face us seem to call for this kind of divine inspiration and guidance that is the very premise of the shamanic journey. The shaman sets out on this journey to receive knowledge and inspiration from the spirits. Indeed, the shamanic journey is direct access to the Muse, the traditional mystical source of inspiration in the West. While in the West we tend to wait to be visited by the Muse, for inspiration to strike, shamans discovered how to go after it on their own terms. By learning shamanic methods of altering consciousness we, too, can obtain all sorts of knowledge and insight including that which we need to balance ourselves and our world. As we shall also discover there is particular relevance of shamanic wisdom for visual thinking that has implications for all creative fields, the arts in particular.

First, however, it is essential to explore the question of why the potential of this ability has been ignored by the dominant world culture. With the advent of rationalism in the West this type of activity was renounced as having no basis in logical thought. Coupled with a religious fervor that would not tolerate competition in spiritual realms, shamans were branded as witches, with the subsequent consequences, unless of course, their visions coincided with the accepted views of the church as was the case with the ecstasy of St. Teresa.

As colonialism pushed Western culture further into new territories shamanism in other parts of the world was also suppressed. Shamans had to abdicate their role within their societies, go underground, or worse. Often there wasn't much resistance even from their own societies. The scientific discoveries in the emerging modern medical profession offered more immediate and predictable results for the people through its rational and understandable body of knowledge. This created an authoritative closed system with logical, scientific explanations that continued to spread throughout the world. Wherever alternative systems existed they were usually dismissed as meaningless mumbo-jumbo or even suppressed as being dangerous.

This scientific knowledge, as advanced as it was, did not have much, if any, understanding of the mind and brain which is essential to any rational understanding of shamanism. It was not until Freud and his contemporaries that anyone really began to make progress on the concepts and connections between the brain and the mind. With Freud came a passionate interest in this topic. Little did he know that he was replanting in Western consciousness the seeds of a body/mind/spirit connection and its relationship to the nature of reality that is inherent in shamanism. Ironically, Freud's theories are now being shown to have less scientific underpinning than shamanism, yet his influence on all of psychology has been felt for the last ninety years. As insupportable as his theories are, they nevertheless focused attention on the function and power of the mind. Its incredible complexity is becoming clearer, and we are realizing that the power of the human mind is just beginning to be tapped. This is with a new understanding that the concept of "mind" itself, as a separate entity, is a limited one. A body/mind/spirit unity appears to be a more useful concept for exploration. We must begin to accept a unity, an interconnectedness of everything in existence. With our increased knowledge we can no longer tell where one part leaves off and another begins. As for our waking consciousness, the means by which we define ourselves, we are discovering that it is only a small portion of a larger spectrum of consciousness. The verbal, logical, rational mind is a very limited aspect of who we are. Other levels of consciousness have more control over our behavior, including our health and well being, than we ever thought possible. Realizations about the effects of stress on our immune systems to the mounting evidence that even terminal diseases can be reversed and "cured" by our "thinking" are forcing us to come to terms with this fact.

Compounding all the confusion of this added knowledge is our present recognition that science; the stalwart of our rational, waking, conscious understanding of ourselves and the world around us; is not objective by its very nature. The observations and testing that it depends on for verification is nothing more than measuring our own yardsticks. Everything that we encounter in the world, including the observations and testing equipment, is perceived by our limited subjective consciousness. We measure and test and state as fact our subjective perceptions rather than objective reality, if in fact, there is such a thing. It is hard to accept rationalism as limited since it has been powerful and advantageous in our evolutionary development. It is at the root of our present domination over our immediate environment and our domination of the planet. The failing of rationalism is rooted in its dynamic success. The knowledge, beliefs, and the abilities it has given us led to its overuse and overdevelopment. We have come to distrust and dismiss the other capabilities we had as a result of earlier evolution.

This condition is the result of using our minds in a way that increasingly fragments, objectifies, and ultimately separates us from the world around us and even from ourselves. This makes it easy for us to use and exploit everything around us. We justify using these things, or other people, or even other living creatures or even eliminating them in favor of our own survival or just for our convenience by seeing them as separate from ourselves, especially if we see them as competitors. Through this emphasis on separateness we have lost our ability to understand and communicate with anything or anyone but those most like us. We, therefore, lose respect for them and usurp their rights. This alienation creates physical and mental stresses and breakdowns in people. This has a cumulative effect on the whole human system and extends to create imbalances in the world. The resulting stresses as seen in politics, economics, and ecology may be leading to the eventual collapse of our planet.

The questioning of science and, thus, our understanding of consciousness forces us to examine a fuller spectrum of what it means to be human. We are faced with the interconnectedness of body, mind, spirit, and the universe; a perspective once thought to be primitive. Aspects of consciousness that were ignored earlier take on greater importance and appear to be vital to a fuller understanding of existence. Our pragmatic view of the world, within a narrow band of consciousness, has reached the limits of effectiveness. The rational, sequential, pragmatic, verbal side of our being needs to be balanced by an increase in the development of the emotional, non-linear, visual, holistic side in order to avoid dire consequences. Where the rational mind seeks immediate goals the other sees the long term, overall picture. Both need to work together for our long term survival. We desperately need to be able to move between two worlds, like the shaman. This broadening of our understanding and use of consciousness constitutes a major paradigm shift with ramifications in all areas of human life. This change has begun to happen. Ironically, it is driven by knowledge that has been under our noses for more than twenty thousand years that we are only now rediscovering. We are coming full circle. Now we can look at "primitive" knowledge in a new light and integrate it into our own belief systems. If we continue to learn and use this knowledge I believe we have a better chance at restoring the world to a healthier, better functioning, more productive whole.

The attributes of a fuller consciousness have been actively cultivated by the shamanic cultures of the world. Unfortunately, many of these cultures have been totally destroyed. In addition, the anthropologic research completed on some of these before their demise was stilted by the beliefs of the times in which it was done. Even so, this research reinforces knowledge and understanding now coming to light from surviving and reemerging shamanic activities when we look at all this from a more open perspective. We find common elements that run throughout most practices of shamanism. The most common element of all is the altering of attention on the spectrum of consciousness in order to gain a different perspective on reality. As shamans see it, this practice brings us in touch with a "truer" reality. Our "normal" consciousness is thought of as an illusion or, at most, a narrow band of possibility.

Focusing our attention now on this practice, it is not surprising that we find many ways to alter consciousness because of the long history and independent growth of shamanism throughout the world. The similar purposes and results are evidence that the shamanic experience is a basic human potential. Entering these states is usually seen as the domain of specially selected individuals. The selection process varies widely from self selection, to passing the power on from generation to generation within a family, to individuals identified because they survive a life threatening illness. Even if passed on or self selected, the individuals undergo an ordeal of initiation that has elements of a life threatening nature. In our psychological terms this could be seen as a profound loss of ego. The result of this process is the ability to see everything from a new perspective with heightened awareness. The programmed responses to the world of the developed ego are broken down through the trauma of this ordeal. This makes the reordering of reality possible. This initial experience has tremendous power. With some it is powerful enough to produce life-long insights. In other cases the individual seeks to alter consciousness regularly through drugs or trance inducing rituals. The power of the mind to routinize our world for efficiency and convenience seems to lessen the effects of the initiation over time. These milder methods of stepping outside the self refresh the insightful abilities that are gained by the original experience. Through these means shamans also seek to probe these alternate realities further to gain a greater understanding of their potential.

The shamanic societies' cultural trappings wove a web around these experiences, giving them relevant structure and meaning, but this also made it very hard for us to understand from our cultural perspective, especially since we had little scientific knowledge about the workings of the brain/mind. From our new, more open, scientific cultural vantage point we can now look at these activities and sift through the magical, mystical, and illusive spiritual entities of shamanism and distill out the essential elements. These altered states of consciousness can then be used for our own growth and advantage.

Jean Houston and Robert Masters have done this very successfully. Triggered by the experimentation of a significant segment of the population with LSD, the government authorized researchers, Houston and Masters among them, to investigate the potential of this drug. The investigations eventually led in many directions including the relationship between drug experiences and other altered states of consciousness that have been reported by mystics, shamans, saints, yogis, and artists. The drug experience produced these ecstatic states with regularity in most subjects while other methods seemed to depend on long arduous training, catastrophic circumstances, unpredictable peaks, or some individual bizarre practices (Balzac drank one hundred cups of coffee). Although easy to attain, the drug state has various undesirable side effects. There are also elements of an unpredictable nature due to its overall effect on the body rather than just having a single specific mind altering effect. Through experimentation with various cultural methods for altering consciousness, Houston and Masters developed safe alternatives to drugs that produced the same results. They seem to have extracted the essence of these methods from cultural trappings.

During this same period many people looked for ways to improve their lives. Some traveled to India to study with gurus or tried to follow ancient American Indian ways based on the popular Carlos Castenada books. All this experimentation proved that these new ways of experiencing the world could have tremendous value for our lives. Slowly all this began to penetrate a wider range of our society. Whether duplicating the cultural, ritualistic methods derived from specific groups or acultural methods, experiences derived from shamanism are now being used in health professions, education, psychology, the arts, and for creativity in every field. The most conspicuous use has been their role in numerous self-help programs. You find both video tapes and audio tapes in any large book store that use some of these methods to help you stop smoking, develop your brain power, or improve your sex life.

Aside from these popular, specific derivatives, why is this seemingly bizarre activity having such an influence? Understanding this becomes especially perplexing if we note that early psychological evaluations indicated that shamans probably suffered mental disorders. Even though rationalism developed beyond fear of witches, the continued misunderstanding of these practices led to the labeling of shamans as "crazy". Some shamans suffered the consequences and were institutionalized. It is not difficult to imagine how someone who has suffered some tremendous ordeal and then claims to have strange visions might be diagnosed as psychotic given our Western beliefs about normal behavior. More extensive and less biased evaluations now show that shamans are generally healthier psychologically than the rest of their contemporaries, being better equipped to handle change and adapt to new conditions. The methods and techniques of the shaman generally involve the development of the physical, mental, and spiritual elements of the individual. The connection, integration, and balancing of these in our interaction with the world develops as a result of the shamanic journey. This creates a sense of well-being. The feeling of being at one with the world which the shamanic experience produces, is the essence of Eastern meditative practices. These experiences, therefore, can contribute greatly to an individuals psychological health with a lessening of our sense of alienation. This evidence might even suggest that some institutionalized Westerners who may have had similar experiences, if accepted, would be of significant value to the society.

Shamans were accepted and not ostracized by their societies. This allowed them to become the link for others to many inaccessible realms. They played particularly powerful roles in helping people deal with death. Since their altered conscious states often took them into contact with the dead, they seemed to have insight about what life-after-death was like. The shaman's people were not faced with death as an unknown after listening to these stories. This alleviated much of this basic human fear. This example alone shows why shamans were valued by their societies. Whether the shaman's knowledge was valid by our standards is unimportant, the powerful effect it had on reducing the stress and tensions of the shaman's people must be judged as being of tremendous value.

The most intriguing aspect of the shamanic experience for me, however, is the ability of the shaman to solve the most difficult personal and societal problems. The solutions to these problems seem to elude everyone else in their community. What goes on during the shamanic journey that gives the shaman this ability? Biofeedback research begins to give us an understanding of what happens during a shamanic trance while other related research helps reinforce this and show us how readily available this state of mind is to us.

Elmer and Alice Green, working at the Menninger Foundation on the conscious control of the autonomic nervous system discovered that we can control brain function itself. The biofeedback devices that allow people to control their body temperature to ease migraine headaches could be used to change and control brain wave activity. They could, in effect, put themselves into various levels of consciousness at will. While in these states their subjects experienced an Eastern type of meditation or hypnogogic imagery that appears to many of us just before sleep. This is similar to, if not the same as, shamanic visions.

The correlation between brain wave activity and states of consciousness is significant. While we are in a normal waking state our brain produces beta waves but as we close our eyes and begin to relax we enter a short phase of alpha wave production. There is no visual imagery at this stage and the mind seems to be blank. This is the desired condition that meditation seeks to reach. By wiring yogis in India with biofeedback equipment, the Greens confirmed that they did, indeed, mainly produce alpha waves. In this state of relaxed awareness, there is a loss of the sense of time and space. A sense of wholeness and peace is achieved. A renewal and amplification of awareness often occurs upon returning to normal consciousness. This seems to have a beneficial effect on creative abilities as well.

As we approach sleep, that moment before we lose consciousness, we may have strange experiences, seeing various images and events that appear to be real. At this stage the Green's found that we produce theta waves. We are unaware of the real world around us during this time and seem to turn inward to a visual intuitive world, a world where our concerns appear in metaphoric visual form. Insights and answers to some of our most difficult problems may come to us in non linear, holographic form. There is evidence that artists in the midst of creative activity, as well as individuals during a shamanic trance, produce mainly theta waves.

The next stage of this continuous route to sleep is that of delta wave activity. This is when we lose consciousness completely and enter deep non-dreaming sleep.

The final stage of brain wave production that occurs normally is a return to beta wave activity. This is the same as in waking consciousness, but it occurs while asleep, while dreaming. It is commonly called REM sleep because of the Rapid Eye Movements that occur while dreaming. If we look only at brain wave activity at this time it appears to be indistinguishable from that of a person that is fully awake.

It appears that what happens during the shamanic state of consciousness is a normal function of the brain. It seems that a fleeting stage of consciousness just before the onset of sleep is selectively held onto for a much longer period of time by the shaman. His tool for this is continuous drumming. It helps him maintain theta brain wave activity. The drumming that often accompanies and helps produce these trances is generally in the frequency range of the theta brain waves. Researchers believe that this may drive the brain to an altered state of consciousness. By listening to particular frequencies of sound the brain begins to replicate that frequency. After a given time a shift in the rhythms of the drumming is then used to bring the shaman back to his fully awake state.

This auditory driving of the brain has been significantly explored by Robert Monroe. Experiments with audio tapes made using his "HEMISYNC" concept seems to show that they greatly improve learning, problem solving skills, and creativity. Feeding different sounds into each ear of stereo headphones creates a third tone differential in the brain, a frequency that is the difference between the other two. A 200 hz signal and a 204 hz signal, for example, would create a third 4 hz tone in the brain of the listener. This is in the frequency range of the brain's theta waves and it has the effect on many people of triggering visions like those of the shaman. Monroe has been successful in exploring many different aspects of consciousness by finely adjusting these frequencies. Some of this is controversial because of its mystical nature.

There are numerous other modern technological methods of tapping into the potentials of body/mind/spirit. In Megabrain, Michael Hutchison describes a number of devices, some bizarre, that drive or induce an altered state of consciousness or otherwise stimulate the brain to be more productive and creative. Some of these directly stimulate the brain with low voltage electric current, a type of "shock" treatment. Other devices vary from elaborate computer controlled biofeedback devices that graphically describe the brain wave activity of the entire brain at any given moment, to a set of special glasses equipped to drive the brain activity both auditorily and visually, to sensory deprivation chambers.

The technique of using sensory deprivation is one that is common to many shamanic techniques. The "vision quest" and most initiation rites depend to some extent on limiting sensory input until "visions" come. Often the individual would be without human contact for days. The sought after revelation would usually come at night when external visual and auditory stimuli are minimal. To encourage this process the practitioners would often prepare for the quest with fasting, chanting, dancing, and abstaining from sexual contact, all of which have their own effect on the brain through physiologic and psychologic actions.

The mechanical devices mentioned vary greatly in their actions on the individual. What has been learned from them, coupled with what has been learned from the other techniques, shows that altered states of consciousness can be created and controlled by disrupting and interceding the normal activities of the body/mind/spirit at any point in the physical, electro-chemical, thought pattern continuum. Some of these altered states, those most closely allied with the shamanic trance state, have very powerful, advantageous capabilities that are not as available to us in the average waking state. The improved learning, increased brain size and development, and greater creativity that these techniques offer are of significant value.

Although "mechanical" methods have undeniable value, they lack some important elements that are deeply embedded in traditional shamanic methods. They lack the emotional involvement and sense of community, security, empathy, and compassion that come with the culturally enriched methods of altered state induction. The total involvement through historic tradition, acceptance by the community, common knowledge of the kind of experience to be expected, and proper psychological preparation, helps the individual integrate the experience into his/her life and the life of the community rather than feeling that they are isolated, strange, crazy, and alone or alternatively that their experience is bizarre and, therefore, has no possible value. The cultural mythology surrounding shamanic methods provides a frame of reference, boundaries within which the mind can structure responses. The range of metaphoric language that results from the experience is confined and fairly well understood within its society since it has been explored for many thousands of years. The resulting experience can often be interpreted in a manner that is useful in the life of the individual or the society. This is of tremendous advantage over similar experiences that are obtained outside a cultural tradition, since the language of the subconscious mind is free flowing or even random. There is not a universal cipher that can be used in determining the meaning of these experiences.

Freud and then Jung, with their attempts at dream interpretation, made great leaps in understanding and deciphering the metaphoric language of our subconscious that incorporated our own cultural mythology. As misguided and misdirected as these attempts now seem to be, they were important first steps in this direction. The methods and meanings they ascribed to subconscious imagery focused attention on our inner world. As neurophysiologists and psychologists continue this exploration we will begin to understand our subconscious world more and more from a Western scientific perspective.

Even without a full understanding, we can direct the subconscious to solve problems, give us insight, and bring health and balance to our whole system of body/mind/spirit. Shamanic journeying and its offshoot, visualization can be directed and controlled for these specific purposes. This is a powerful tool in all creative fields and any field where new insights and perspectives are needed.

Usually being a visual experience, though not always and not for all people, journeying is of particular value in the visual arts. New perspectives are gained on issues of importance to the artist and society. Ideas flow from a never ending source. They are communicated to the artist with rich imagery and metaphoric imagination that is immediately applicable to communicating it to others. It is almost only necessary to record the imagery as it was experienced without the usual struggle that most artists have trying to consciously tease images out of their subconscious through the manipulation of their medium. The sense of adventure and discovery takes place in the mind with a delightful air of entertainment. Artists quickly become in touch with issues that are important to them. Artists are often searching for answers to undefined questions. Instead of wasting time struggling with a process that is caught up in established ruts of patterned thinking, the artist is free to explore a much wider array of experience. The struggle and repetition that most artists go through is the result of having both their questions and answers buried deep in the subconscious. The methods traditionally used by artists only haphazardly penetrate that realm, while visualization and journeying go directly to the heart of the matter.

Some of the methods that can be used to attain these goals are embarrassingly simple and can be used by anyone. It is essential to be relaxed and not mentally preoccupied with other things. This can be accomplished by various means but one that I have found to be effective incorporates a technique derived from Neuro-Linguistic Programming.

RELAXATION TECHNIQUE:

Continuously turn around in place, count backward from 100, clap your hands, and remember the house you grew up in. After a few minutes the brain becomes overloaded and frees you from your previous concerns. Next sit or lie down and concentrate on your breathing for a few seconds. Finally, imagine a gentle warmth slowly filling your body. This exercise should relax you. This preparation can now lead in many directions.

VISUALIZATION EXERCISES:

Usually it is helpful to begin with a fully guided imagery experience. Close your eyes and listen to a narrative that is full of sights and other sensations. This can be on an audio tape that is prepared ahead of time or have another person guide you on a journey they devise. The narrative can be nonsensical and go on as long as you want. It usually takes a few minutes to establish the trance-like concentration necessary to clearly "see" images. This exercise helps develop the imagination, the ability to visualize, and allows you to become comfortable with these procedures. A trance-like state is established and maintained easily if the narrative is flowing and continuous without jarring elements. It is helpful to connect thoughts with words such as "and", "while", and "as". This keeps the mind engaged. (Example: "As you walk down the street you see blue birds flying overhead while a bus passes on your left making lots of noise and then a child runs up behind you laughing as he tries to lick an ice cream cone".)

The next experience can deal with specific problems. Starting with the same type of narrative you can be led to a point where a particular problem is about to be solved but then you are left off and allowed to continue the journey on your own. After a few minutes you are called back. You will probably have the answer you were looking for. An alternative is to be led on a journey to a wise person who will teach you what you want to know.

Finally, after the previous practice, just wander freely in your own mind and see what it has to offer. Even here, it is helpful to begin the journey by imagining going through an entrance to some other place or even into another world. With continued practice many surprising things begin to happen. Some people take a few times before they are really able to imagine much, while others do so immediately. Still others never "see" anything but they may sense or feel or hear things. This method is enhanced by auditory driving and there are tapes of drums and other instruments that are available for this purpose if you are not proficient at it yourself. (Remember the frequency range is significant).

There are more involved methods that combine chanting, rattles, drums, darkness, and dancing. These tend to produce more dramatic results being much closer to true shamanic methods. They also require a great deal of trust and acceptance on the part of the participants. At this level it would be helpful to read Michael Harner's book "The Way of the Shaman" for an in depth understanding of the procedures.

Throughout history artists have had flashes of inspiration. The imagery and insights were often so fresh and unexpected that they didn't believe they came from themselves alone. Because these experiences were so far outside normal experiences in life they were believed to be coming from forces outside the individual. Poets believed they were visited by the Muse. Their insights were thought to be a form of divine inspiration. The extremes that people went to for inspiration was comedic at times. As mentioned previously, Balzac is reported to have drunk one hundred cups of coffee a day to attain a state of consciousness where ideas came to him. Descartes wrapped his head in damp, warm towels while placing it close to a fire, in effect, boiling his brain to obtain insights. Alcohol, by virtue of its anti-inhibitory action and depressant nature loosened associations in many artists and overcame established programming but also often led to disastrous results. Others found drugs or other substances that helped make the the connection with their Muse. Unfortunately they were unpredictable and often destructive. With the lack of understanding about where creativity came from and because of overwhelming positive results, it is understandable that such measures were pursued. They did not realize that they could easily delve into their own depths for insight using methods that had been all around them in the world of the shaman. Through the shamanic journey we do have easy and direct access to the Muse within our selves.

The practice of shamanic-like journeying techniques also seems to have a cumulative effect. The more we learn to visualize and travel through our subconscious, the more we tend to free up our associative thinking even in our conscious mind. It is almost as if we are beginning to eliminate the dichotomy that exists between them. Creativity and problem solving ability is greatly increased. The more practice we have in letting our mind wander in the subconscious realm the more readily we have conscious control of its power.

Even with our ever increasing knowledge of the brain many things still appear to be magical and unexplainable. The experiences that people have had sometimes, seem to be of events that could not be known to the individual. These might be of death, contact with spirits or ancestors long dead, or what appear to be past lives, or travel to previously unexperienced places. The detail that is present in these visions seems to indicate that there was some kind of direct experience outside the limits of both the conscious and the subconscious, a mystical connection to another reality. As one explanation, Jean Houston has theorized that since we remember almost everything that we have experienced in our lives, at least back to our first few years, we have an enormous storehouse of material to draw upon to create subconscious realities. With exposure to material such as "Life" and "National Geographic" magazines as well as television, film and other media with their wonderful pictures and renditions of how life is, or was, in various remote places and at distant time periods it is not so surprising that we would be able to construct these events into a familiar reality.

There is also a great deal of evidence from psychological sources that indicates that the subconscious mind has difficulty distinguishing fact from fiction. Therapies such as Neuro-Linguistic Programming (NLP) use this concept to help people overcome psychologically debilitating experiences. By inducing a trance like state the client is brought back in time. Through the guidance of the therapist (programmer) the client rewrites their own history, creating an alternative for the mind that would be more supportive of a positive condition for the client. The effectiveness of this and similar techniques seems to support the theory that at some level our mind does not always distinguish fact from fiction. This supports Houston's theory and might explain what seems to be paranormal. Whether we are capable of contact with other realities or just our own memory it is clearly evident that we are capable of tapping incredible powers that our modern, technologic, rational world has overlooked or squashed in a one sided, narrow vision of what constitutes reality in the universe.

Since we are here in Arizona, I'll conclude by talking about frontiers. The American West was once thought to be the "'last frontier". Neuroscientists are now referring to the brain as our new "last frontier". "If the brain is not the 'last frontier' it is certainly a frontier", says Michael Hutchison in Megabrain. "It has all the things that make a frontier so interesting - mysteries, strange inhabitants, legends and myths, vast unexplored areas, possibilities for adventure, heroism, self discovery, self transformation, new wisdom, and sudden unimaginable wealth. Our exploration of this frontier has only begun. We are now at a crucial and decisive moment.

What direction will our exploration and development of the brain frontier take? The exploitive, destructive course we took in exploration of our geophysical last frontier, the American West? Or a new type of exploration that benefits the entire race, the whole earth, and potentially the universe?" (Hutchison pp. 313-314) It seems appropriate that this new frontier that Hutchison talks about might be explored through a potential that was so highly developed by Native American shamans, people who were among the first occupants of this old frontier.

BIBLIOGRAPHY

Arieti, Silvano; Defining and Developing Creativity, A Psychology Today Cassette, Ziff-Davis Publishing Co.; 1977.

Eliade, Mircea; Shamanism, Archaic Techniques of Ecstasy, Princeton University Press, Bollingen Foundation; 1964.

Green, Elmer and Green, Alyce; Beyond Biofeedback, Delacorte Press; 1977.

Harner, Michael; The Way of the Shaman, Bantam New Age Books, NY; 1980.

Hobson, J. Allan; The Dreaming Brain, Basic Books, Inc., NY; 1988.

Houston, Jean; Genius, Creativity , and the Turned-On Mind, Institute for Mind Research, NY.

Houston, Jean; The Possible Human, J. P. Tarcher, Inc., Los Angeles: 1982.

Hutchison, Michael; Megabrain, Beech Tree Books, NY; 1986.

Kalweit, Holger; Dreamtime and Inner Space, Shambhala Publications, Boston; 1988.

Krippner, Stanley; Scientific Approach to Mysticism, The Center for Cassette Studies, Inc., N. Hollywood, CA.

Mails, Thomas E.; Secret Native American Pathways, Council Oaks Books, Tulsa, OK; 1988.

Nicholson, Shirley, editor; Shamanism, The Theosophical Publishing House, Wheaton, Ill.; 1987.

Reston, James; Mission to a Mind, Omni, V.6, p.50-3+, July 1984.